The Chemical Age

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Notes and Comments

The Benefits of Ottawa

THE secrets of the agreements reached at the Imperial Conference at Ottawa three months ago, showing what advantages the Dominions are prepared to give to British trade, were revealed on Wednesday in the form of a Blue Book of some 94 pages, covering hundreds of classes of goods. So far as the chemical industry is concerned the high hopes held out by its representatives who attended the Ottawa proceedings were realised, and the optimistic tone of the speeches delivered at the annual dinner of the Association of British Chemical Manufacturers last week has proved to be amply justified. In other pages we give a summary of the main agreements, from which it will be seen that Canada is the Dominion principally concerned. There are to be immediate modifications of duties levied in respect of some 215 items. In 79 cases duties are to be abolished altogether, and in 53 other cases the duties are to be lessened. In the remaining 83 cases the benefit to the United Kingdom comes from an increased margin of preference against goods from foreign countries.

In the light of these agreements there will be an enhanced interest in the bold policy outlined by Dr. E. F. Armstrong in his speech as chairman at the annual meeting of the A.B.C.M., reported fairly fully in pages 355-356. Dr. Armstrong is of the opinion that the time has come for a united sales organisation for the chemical industry with regard to its Canadian trade, and sets out in detail a few of the many advantages which would accrue from a wider application of the policy already pursued within certain restricted limits by the Imperial Chemical Industries organisation. We are glad to note that he recognises the importance of the separate manufacturing companies maintaining their individuality so far as home organisation is concerned. Dr. Armstrong calls for action as well as discussion, and it will be interesting to see to what extent his wise counsel is adopted.

Why Import Foreign Chemical Products ?

THE letter from a correspondent on another page, asking why metaldehyde is not made in England, brings up the point that there must be scores of chemical products, still imported from abroad, which might just as well be made over here, particularly now that tariffs go at least some way towards counteracting the foreign manufacturer's advantage in lower wages and longer working hours. Every one of these imported products represents a loss of wages to our workpeople, less employment for our chemists and engineers, loss of orders to our plant manufacturers, and goes to swell the adverse balance of trade. Why should this continue? In the past English chemical manufacturers undoubtedly suffered from an inferiority complex, and it took the war to break this down. Who can doubt that, but for the war, we should still to-day be importing 90 per cent. of our dyestuffs and a big proportion of our fine chemicals and pharmaceuticals? Even now, in our opinion, more than a little of this complex remains.

To take a few examples at random, we beat the Germans at their own game of poison gas, and we have beaten them on optical glass, chemical glassware and porcelain. In fact, whenever, driven by necessity, we really get down to it, we get there without fail, but it seems to require a violent stimulus to get us going. Surely the present world depression ought to provide such a stimulus. The time has come for a bold policy; for an intensive search for new products to make, a steady replacement of old and inefficient methods by modern scientifically planned plants and processes, and a determination that as soon as possible every requirement of the English and Empire user of chemicals shall be met by an English-made product. The brains and the knowledge are there waiting to be used; all that is lacking is the confidence and initiative, and we fully believe that those who accept and act on this view now, without waiting to see what others are going to do, will be amply repaid for their pluck before many years are over. We intend to do everything in our power to get the chemical trade of this country back to a flourishing condition. We shall welcome information from our readers at home and throughout the Empire regarding chemical products at present only obtainable from foreign sources, and regarding new uses for products and new markets which need developing. In order to assist the smaller manufacturer who has no facilities at hand for looking up the literature regarding processes and patents in connection with any new products he may be interested in, we invite inquiries on such matters, and also on questions of works, planning and equipment.

Manchester Leads the Way

CONGRATULATIONS are due to the chemical and allied organisations in the Manchester area upon the formation of a committee of their secretaries for consultation and co-operation where problems of mutual interest can be discussed, plans for the common good arranged and where Manchester chemical opinion can be sounded and expressed. In these days of specialisation, chemistry has become sectionalised like every other science until it is difficult to see the wood for the trees. Specialists societies speak with many voices and in diverse tongues, and it has become exceedingly

difficult to hear and understand the views of chemical opinion and to find a way of sounding that opinion when desired. The newly formed Manchester Chemical Societies' Joint Advisory Committee will meet this need. It is not, of course, an executive body, but rather advisory and consultative.

Members of the committee are the hon. secretaries of the Manchester Literary and Philosophical Society and the Manchester and district sections of the Institute of Chemistry, the Society of Chemical Industry, the Society of Dyers and Colourists, the Oil and Colour Chemists' Association and the Institution of the Rubber Industry. These societies may at any time appoint a deputy for their hon. secretaries. The first task of the Joint Advisory Committee has been to publish a calendar giving the complete list of meetings of chemical and allied societies in Manchester during the winter session. This is issued in booklet form, embracing the constitution of the committee and the respective programmes of the six constituent bodies, and also in convenient card form, with all the meetings arranged in chronological order, and including meetings of the Institution of Mechanical Engineers, the Association of Scientific Workers and the British Association of Chemists, which are not, at the moment, officially represented on the committee. The joint calendar is believed to be the first publication of its kind ever attempted in this country.

Constitution of the Committee

THE constitution of the Manchester Chemical Societies' Joint Advisory Committee sets forth as its main objects the following: (a) to arrange joint meetings and co-ordinate any other meetings and social functions; (b) to publish annually a calendar of meetings held by Manchester chemical and allied societies; (c) to evolve and promote schemes of co-operation between the societies concerned; (d) to maintain a list of members of the participating societies; (e) to receive and consider applications for representation on the joint committee, and (f) to act in any other advisory or co-ordinating capacity on matters affecting chemical and allied societies in Manchester and district. Among the economies effected immediately is the publication of the calender of meetings in Manchester throughout the winter session in place of the syllabus by individual societies. This makes an exceptionally useful work of reference and immediately puts each member of each society in touch with *all* the chief chemical meetings within reach. It enhances the value of membership to the individual and emphasises the new unity which it is desired to foster.

It is understood that nothing is further from the minds of those concerned with the new movement than that societies should lose their present individuality. The specialist chemist has joined his specialist society because he wants to hear discussed the special problems with which he is in contact. The new committee understands and upholds this feeling. There are many fruits of contact however; many problems of mutual interest, and considerations of a fundamental character where societies would gain by collaboration. The committee will provide the machinery for organising these at short notice. Moreover, there are many ways in which chemical opinion can and should be consulted in local affairs, in education circles, by kindred organisations dealing for example with arts, engineering, physics, medicine, etc., and the new committee will be a suitable channel of approach.

Information Research

IMPLICATIONS underlying research work were illuminated from various angles at the ninth conference of the Association of Special Libraries at Information Bureaux, which was held recently at Oxford. Scientists, it was pointed out, make the discoveries, and the world applies these discoveres or misapplies them. The difficulties of the situation with which scientists, industrialists and other users of specialised information are now faced formed the theme of the presidential address delivered by Sir Charles Sherrington. In the sphere of research there is an abundance of information but only very inadequate machinery for its co-ordination and distribution to the proper users, and for this reason the need for the Association was very great in order to prevent the graver waste which is taking place in all branches of science.

More real co-operation between the libraries and research workers is of primary importance, and Sir Charles stressed the immediacy of this need in view of the great revival of science taking place in Japan, Italy and South America. He also expressed the hope that the time will arrive when the Governments of the world will assist the Association to make an international catalogue of scientific subjects. Among new developments which the Association has under consideration is a proposal for the publication of an advance index to scientific papers, taking the form of a monthly bulletin; the preparation of an index to the many unpublished documents compiled by various institutions and societies throughout the country; and also the preparation of a guide to business information.

Oxygen Industry Mergers

THE directors of the British Oxygen Co., Ltd., have given the ordinary shareholders notice of an extraordinary general meeting to be held on October 27 for the purpose of approving a conditional agreement which has been entered into with Metal Industries, Ltd., and Oxygen Industries, Ltd., and authorising increases in the nominal capital and of the number of directors. The proposal about the capital is to increase the ordinary shares by 250,000, making the total authorised 1,750,000. The preference shares will be unaffected. The total capital will then be £2,250,000, all of £1 denomination. The new shares are required partly to satisfy the purchase consideration for the businesses, in so far as they relate to the dealing in the manufacture of the commodities in which the company trades, of the firms mentioned, and partly to have a reserve of unissued capital for future contingencies. The directors do not disclose the terms of the proposed acquisitions, but promise a full statement at the meeting.

The British Oxygen Co. absorbed Sparklets, Ltd., in 1921, and acquired in 1929 nearly all the capital of Liquid Air, Ltd. In 1930 this was followed by the acquisition by exchange of shares of all the capital of Allan Liversidge, Ltd., whose business with that of its subsidiaries, the Dissolved Acetylene Co., Ltd., and Imperial Light, Ltd., were merged with that of British Oxygen, Ltd.

The Treatment of Coal Tar

By J. C. KING and M. A. MATTHEWS

These extracts are taken from a paper read before the Institute of Fuel, on Wednesday, October 12. This paper was especially of interest in view of the necessity for utilising the large quantities of tar which are at present unabsorbed by ordinary markets.

IT is now generally accepted that the carbonisation industries are faced with the problem of finding markets for all the tar which they are producing. Foreign markets, at one time a profitable outlet, are gradually finding their own home supplies and it seems not impossible that this outlet may eventually disappear. It therefore behoves the industries affected to discover new markets at home in which to offer their products, or new processes in which their tar can form the raw material. During the past decade the amount of coal carbonised increased slowly up to 1929, but has decreased markedly since then owing to depression in the iron and steel industries. The variations have been reflected in the amounts of tar produced. It seems probable that this depression will not persist and, with increased attention being paid to low-temperature carbonisation, that tar production will tend to increase again in the future.

	Tar Distilled (tons).
1923	1,670,000
1928	1,850,000
1929	1,950,000
1930	1,650,000
1931	1,480,000

The Market for Tar Products

The only important tar product which is supplying an unsaturated market (motor spirit) is benzol. It is true that there are other unsaturated markets, but these concern quantities so small in proportion to the amount of crude tar produced that they affect the main situation even less than the benzol market. Thus, it is understood that there is at present a shortage of toluene and that more pure phenol could be absorbed since it is the most satisfactory raw material for the making of synthetic resins. Among the other markets, that of road tar stands out as having a special importance. This product is obtained by the very simplest treatment, it represents almost the whole of the tar (85 to 90 per cent. of horizontal retort tar), and the remainder, benzol, naphthas and creosote would, in the absence of competition in the creosote market, be readily absorbed. We are given to understand that the road tar market is now about 850,000 tons per annum and that, in addition, about 350,000 tons of bitumen are used on the roads. If the removal of prejudice against tar, and the improvement of technique in its use, could result in the replacement by tar for all bitumen other than the minimum required for blending, the result would be a substantial increase in the available market for tar. This possibility is particularly attractive in view of the fact that road tar contains most of the creosote which is now almost unsaleable.

The pitch market is perhaps the next most important, amounting in 1929, 1930 and 1931 to 0.55, 0.44 and 0.31 million tons respectively. In the manfacture of pitch, benzol, naphthas and creosote are also produced, and it is here that the over-production of creosote really occurs. The pitch market has in past years been somewhat variable, particularly as to price, but there seems no possibility of an increase of any moment. It is certain that the production of pitch will involve the problem either of utilising creosote in new ways or of converting it at a reasonably low cost into products which will compete in less saturated markets.

The use of tar or tar products as fuel oil cannot be included as a possibility while petroleum fuel oils are available at so low a price. This does not mean that they are unsatisfactory as fuels, but is simply a question of price. Crude fuel oil prices now vary with the demand and the amount in question. The quoted price is about 67s. per ton, but sales at as low a figure as 22s. are often recorded. Crude tar or tar distillates form quite satisfactory boiler fuels, their only disabilities being a low calorific value and, in the case of crude tar, immiscibility with petroleum; the latter would necessitate the provision of special storage and feed tanks. Tar distillates can, however, compete in the higher priced markets of gas oil and Diesel engine oil. Although difficulties exist in both cases, since petroleum oils are more suitable, there is no reason why these markets

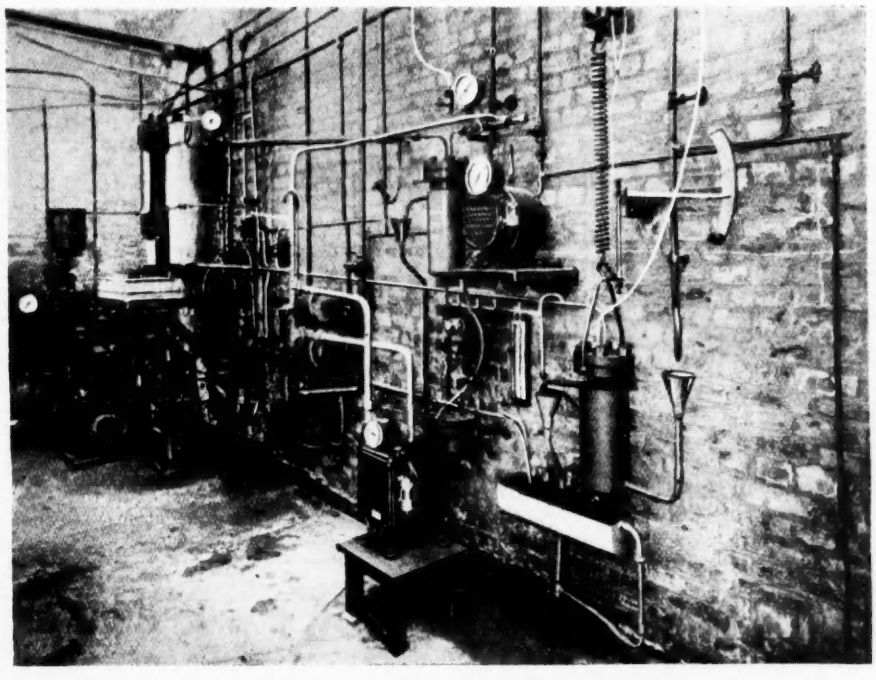


Fig. 1.—Plant for the Hydrogenation-Cracking of Low Temperature Tar, capacity 5 gal. per day

should not be attempted. An added incentive is the imminent development of the high-speed compression ignition engine for road vehicles.

The solution of the problem of tar utilisation can therefore be treated quite generally as one involving (i) the greater utilisation of tar for road purposes, avoiding the production of unmarketable products; (ii) the conversion of the unsaleable products formed in the manufacture of pitch and special products into products capable of competing in unsaturated markets; (iii) the finding of new products in tar to compete in existing unsaturated markets.

Fuel Oil from Tar

It was realised during the war that crude tar cannot find general application as a fuel in view of the fact that, when mixed with petroleum fuel oils, pitch is precipitated. Storage or other tanks cannot therefore be usd for both fuels. This rules out tar as a fuel oil and now, in addition, the price of petroleum fuel is so low that this market is not an attractive one for tar products. Coal tar distillates are, however, miscible with petroleum and can be used without difficulty.

During 1929, in order to assist the tar industry, 10,000 tons of creosote were purchased by the Admiralty and burned in admixture with Trinidad fuel oil (one part creosote to two parts fuel oil) on a number of H.M. ships. It was found that the mixture burned quite satisfactorily at injection temperatures of 140° to 200° F. with no unusual amount of carbon deposit and no excessive choking of the filters. It was also reported that precautions in handling were necessary in order avoid skin irritation, and that there was more smell on deck than when burning petroleum oils. In reply to a Parliamentary question in 1931, it was stated that "creosote had many disadvantages as compared with petroleum fuel oils," and that, "owing to technical difficulties, it can only be used as fuel in H.M. ships when mixed with a much larger quantity of petroleum oil fuel." It is understood that these difficulties are the noxious fumes and the danger of choking of the oil system with precipitated naphthalene and anthracene. The extent of dilution of the creosote which is necessary to prevent this is indicated by the experimental fact that naphthalene and anthracene are deposited from mixtures of creosote and petroleum oil when the proportions in the mixture exceed about 7 and 0.25 per cent. respectively. Similarly, pitch is deposited if its amount in the creosote exceeds about 2 per cent. The possibility of purchasing further quantities of creosote, however, was considered in 1931 and a specification was drawn up for this purpose.

It is as a substitute for petroleum gas oil and compression-ignition engine fuel that tar distillates would appear to have a better chance of disposal at a profitable price. Average prices of gas oil and Diesel oil in 1931 were 65s. and 63s. per ton respectively. This market, as stated above, is particularly interesting in view of expected developments in the use of the high-speed Diesel engine for road vehicles. So far as the essential requirements for such oils are concerned there is no difficulty in making the creosote fraction of tar suitable. It is high in specific gravity, but its flash point, viscosity, distillation range, sulphur, water and ash content can all be made suitable without difficulty. The calorific value of creosote is about 17 per cent. less than petroleum fractions of the same distillation range, but, since their specific gravity is higher, 1.03 against 0.87, their thermal value per cubic foot is slightly higher, 10.8 against 10.3 therms.

Hydrogenation-Cracking of Tar

The published work on the cracking of tar to produce motor spirit has been almost entirely confined to low-temperature tar. Dunstan has found that the yields of spirit obtained were poor (8 per cent. up to 200° C.), and, when the whole tar was treated, large amounts of coke were formed which would necessarily detract from the efficient economic working of any continuous process. Egloff and his co-workers have obtained better results by treating low temperature tar in a Dubbs cracking plant. They report 22 to 24 per cent. yields of acid-free motor spirit (b.p. 0° to 224° C.), in addition to tar acids and 18 per cent. of Diesel or fuel oil. Still better results have been obtained in a small (300 barrels per day) Dubbs plant installed at the Langerbrugge (Belgium) Power Station. The tar is obtained from Salermo and Thyssen carbonisation plants and only that portion boiling above 220° C. is subjected to cracking. This yields 28 per cent. by volume of acid-free motor spirit (S.G. 0.78). of which 35 per cent. distils below 100° C. and 95 per cent. below 200° C. The unit as a whole produces from one ton of coal :—

Motor spirit from carbonisation and cracking gas	3.0	
Motor spirit by distillation of tar	2.5	10.0 gal.
Motor spirit by cracking of residue	4.5	
Tar acids	2.9 gals.	
Coke residue	5 to 6 cwt.	

The cracking pressure used is 23.5 atmos., and the temperature is 480° C. The plant can, alternatively, be worked to give a pitch residue, but then the yields of spirit are lower.

As an alternative to cracking, work has been carried out on the hydrogenation under high pressure—hydrogenation-cracking—of low-temperature tar and high-temperature tar products, but most of this work has been published in the form of patents. It would appear from these patents that tars and oils are capable of almost complete conversion to motor spirit with the aid of suitable catalysts and under suitable conditions of treatment. Unfortunately, the scope of most of the patents is so wide that it is impossible to glean much definite information from them. The mechanism of the process can be regarded as cracking under a high pressure of hydrogen, the purpose of the hydrogen being to stabilise the fragments of the cracked molecules and prevent their further polymerisation or degradation into carbon. In view of the distinct promise of such a method of treatment, experimental work was started at the Fuel Reearch Station at the end of 1929, using low-temperature tar as the raw material, but with the understanding that the investigation would be extended to include high-temperature tars, tar distillates and the tar-like material produced by the first stage of the hydrogenation of coal.

Experiments at the Fuel Research Station

Experiments were started on a laboratory scale using high-pressure vessels ("converters") of two litres capacity. These reaction vessels were similar to those used by Bergius in his pioneer work upon coal. With such converters, the conditions of temperature pressure and hydrogen concentration were determined, under which cracking and hydrogenation could take place without the formation of a carbon residue. Having found these conditions, further experiments were carried out in which the effect of added substances (catalysts) upon the reactions was examined. Briefly, the method of treatment is to charge a two-litre converter with 250 gm. of tar and 5 per cent. of the catalyst, secure the head and charge to a predetermined pressure with hydrogen, discharge this hydrogen, and recharge to 100 atmos. The converter is heated to the requisite temperature (usually 450° C.) during two hours and maintained at this temperature for a further two hours. During the heating period the pressure rises to 200 to 250 atmos. owing to the expansion of the gases, and, if hydrogenation takes place at all extensively, the pressure at the end of the period of heating drops to about 168 atmos. when hot, or 40 atmos. when cold.

After an extensive examination of various catalytic materials, it was found that some catalysts have an adverse effect on the reactions and accelerate coke formation (*e.g.*, calcium oxide and hydride); some convert tar acids into neutral oil (*e.g.*, iodine, hydriodic acid, molybdic acid, molybdic acid and sulphur, tungstic acid and sulphur), and some convert pitch into neutral oil (*e.g.*, molybdic acid, molybdic acid and sulphur, tungstic acid and sulphur, tin oxide, chlorine, bromine and iodine. Molybdic acid was found to be the best general catalyst for the treatment of tar, and many experiments were made to find the most active form of molybdenum. It was found that the addition of sulphur increased its hydrogenating power, the catalyst then being in the form of MoS_2 with hydrogen sulphide present in the gaseous phase. It was subsequently found that reproducible results could not be obtained owing to variations in the degree of accessibility of the catalyst. This variability could be reduced to a negligible value only when a large catalytic surface was exposed to the reactants, a condition which obtains, for example, when the catalyst

is impregnated on a porous support. Active charcoal was found to be the best support; when impregnated with molybdenum in the form of ammonium molybdate, it gave the highets conversion to spirit.

The crude product obtained from the experiment using the catalyst was an amber-coloured oil, containing only a trace of sulphur, and completely soluble in light petroleum (b.p. 40° to 60° C.), indicating that it contained no pitch.

Small-Scale Experimental Results

In due course a plant was designed and erected for the continuous treatment of five gallons of low-temperature tar per day at 200 atmospheres pressure and at temperatures of 450° to 460° C. and 480° to 490° C. in the liquid and vapour phases respectively (Fig. 1). The converter is heated externally by an electric furnace. Tar and hydrogen under

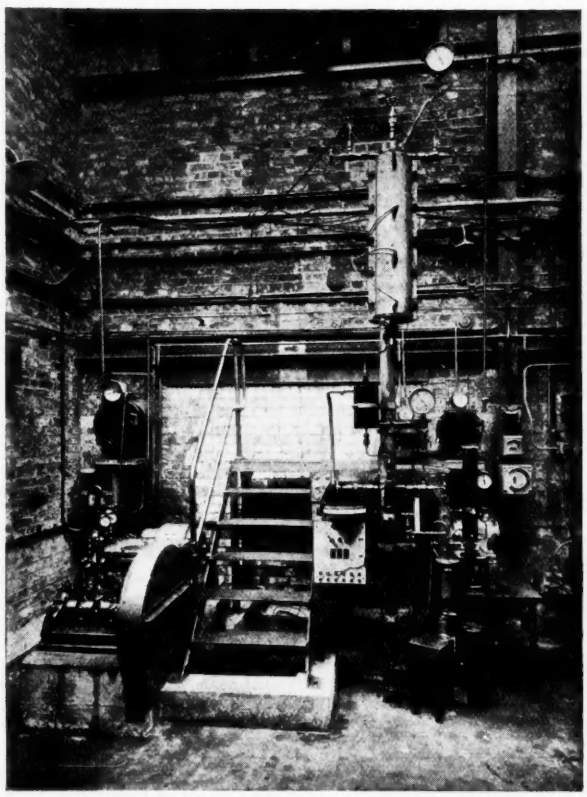


Fig. 2.—Plant for the Hydrogenation-Cracking of Tar Oil, capacity 5 litres per day

pressure are fed in at the top of the converter and pass down through an internal pipe to the bottom. The tar and hydrogen are thus preheated before entering the catalyst space. The catalyst is contained in a cage which just fits the reaction vessel, the vapour and liquid phases being separated by a perforated plate. In the liquid phase compartment there is a baffle plate about one inch from the bottom, which prevents the formation of a stagnant layer of liquid at the bottom of the converter and thus avoids unnecessary coke formation.

The preheated tar and hydrogen pass from the bottom through the liquid and liquid phase catalyst. The liquid in the reaction vessel is maintained at a constant level by a stand-pipe from which "heavy product" is withdrawn intermittently. From the liquid phase the low-boiling portion of the tar vaporises together with the fresh low-boiling material formed. The mixture of vapours and residual hydrogen passes upwards through the bed of vapour-phase catalyst. The products then pass through a condenser to a receiver where permanent gas and liquid ("light product") are separated.

The results of a typical experiment, using impregnated charcoal containing 25 per cen of ammonium molybdate as catalyst for both liquid and vapour phases, are given below :—

Experiments on Continuous Hydrogenation of Low-Temperature Tar.

	Kg.		Kg.
Tar (dry)	100	Light products	75
Hydrogen	17	Heavy products	8
		Water	6
		Residual hydrogen ...	8
		Gaseous hydrocarbons ...	15
		Loss	5
	117		117

S.G. ... ... Light product 0.85, heavy product 0.92

Spirit and Oil Yields.

To 200° C. (2% tar acids) ... ... 45 per cent. by weight of tar.
Diesel oil, ... 38 per cent. by weight of tar.
Refined spirit—
Aromatic hydrocarbons ... ... 40 per cent.
Unsaturated hydrocarbons ... ... 4 ,,
Saturated hydrocarbons ... ... 56 ,,

When these results are considered on a coal basis, it is found that, where one ton of coal produces 20 gal. of low-temperature tar, hydrogenation-cracking of this tar *in one stage* will produce :—

Motor spirit to 200° C. ... ... 11.6 }
Diesel oil ... ... 8.6 } 20.2 gal.

with an expenditure of 2,400 cu. ft. of hydrogen.

The spirit produced, after refining with 70 per cent. sulphuric acid and caustic soda, was water-white and had a specific gravity of 0.80. Its distillation range was 18 per cent. to 100°, 31 per cent. 100° to 120° C. and 48.5 per cent., 120° to 200° C. On storage in daylight it remained water-white for several months; after three months the amount of "preformed gum" was 3 mgm. per 100 c.c. The anti-knock value of the spirit was high, 1.3 ratios above Summer Shell. The high-boiling oil conformed with the B.S.I. specification A for Diesel oil with the exception that it was not of petroleum or shale origin. Its spontaneous ignition temperature was rather high, 350° C.

Behaviour of Tar Constituents

Tar is a complicated mixture of different types of organic compounds and the conditions of treatment for the best conversion of any one compound into motor spirit are not necessarily those most suitable for other compounds. The conditions chosen for the treatment of tar must therefore be the average, taking into consideration all the compounds present. For this reason it is essential, in order to gain a better understanding of the reactions taking place, to examine the behaviour of pure substances, typical of the compounds occurring in tar, under similar hydrogenation-cracking conditions. With a knowledge of the approximate composition of the starting-out material, it should then be possible to control the conditions of hydrogenation so as to achieve the best results. For example, phenol can be looked upon as representative of the tar acids which occur in appreciable quantities in tar.

A study of the hydrogenation reactions of phenol in the presence of a molybdenum catalyst shows that two main reactions proceed simultaneously. In one reaction phenol is converted directly into benzene, and in the other reaction cyclohexanol is first formed and afterwards converted into cyclohexane. The net result is that a mixture of benzene and cyclohexane is obtained. Now, for the production of motor spirit, benzene is to be preferred to cyclohexane since the former confers a high anti-knock value on the spirit and the formation of the latter consumes four times as much hydrogen. In order to suppress the formation of cyclohexane it would be necessary to work at a lower pressure since it has been found that, with one atmosphere pressure of hydrogen, it is possible to convert phenol into benzene, and other phenols into the corresponding aromatic hydrocarbons without the simultaneous formation of naphthenic compounds. In the pressure-hydrogenation of tar, however, both reactions occur and the tar acids are converted into a mixture of aromatic and hydro-aromatic hydrocarbons.

It appears to be a general rule that pressure-hydrogenation tends to eliminate the elements oxygen, nitrogen and sulphur in the form of water, ammonia and hydrogen sulphide with the simultaneous formation of hydrocarbons. Tar contains

a number of aromatic hydrocarbons of which naphthalene is one of the simplest, and occurs in large quantities in high-temperature tars. This compound first of all hydrogenates to form tetralin, the alicyclic ring of which opens with the formation of a series of benzene hydrocarbons, chief among which are benzene and toluene. The proportions of these compounds can be varied according to the temperature and conditions of treatment. It has already been shown that there is a strong demand for toluene, whereas naphthalene is a drug on the market. Hydrogenation-cracking supplies the means for the conversion of naphthalene into toluene. In a similar manner, it is to be expected that other condensed nuclear aromatic hydrocarbons break down into simpler and lower-boiling hydrocarbons.

Continuous Treatment of Tar Oils

In order to continue the work upon tar oils under conditions in which the variables would be under control, a small laboratory plant was purchased from Chemical Reactions, Ltd. This plant (Fig. 2) was designed for the study of vapour-phase reactions. It consists of a hydrogen compressor, oil pump, electrically heated reaction vessel, water-cooled condenser, high-pressure separator, low-pressure receiver for the liquid product, scrubbers, meters and auxiliary apparatus. Hydrogen and oil are fed at the desired pressure (usually 200 atmospheres) into the top of the reaction vessel, which is of 730 c.c. capacity, and is filled with prepared catalyst. A thermocouple pocket passes through the centre of the reaction vessel to enable the temperature throughout to be measured or explored by means of a multiple-junction thermocouple. The oil vapourises at the top of the reaction chamber, mixes with the hydrogen, and the mixed vapours, pass downwards through the bed of catalyst and out at the base of the vessel into the condenser and thence to the separator. The residual gas leaves at the top of the separator through a needle valve, which reduces its pressure at atmospheric, passes through a flow meter for controlling the rate of passage, an iron oxide purifier, a meter, and is finally collected in a holder. The passage of the liquid product into the low-pressure receiver is controlled by means of a needle valve at the bottom of the separator. The dissolved gas which is liberated on reduction of pressure passes through a caustic soda wash-bottle and a meter and is collected in a holder.

Using this apparatus, two experiments have been conducted upon (i) low-temperature tar oil, distillation range 9° to 360° C. (Dalton Main Coal), (ii) creosote from horizontal-retort tar (Durham coal). Sample (ii) consisted of the entire distillate, to pitch, from a typical tar, excluding the benzol fraction. It was considered that, if this product could be treated satisfactorily, any special or residual creosotes would also be amenable to treatment. Two reaction temperatures, 480° and 495° C. were tried; tar oil was fed at the rate of 200 c.c. per hour, but the residual gas was drawn off at the rate of 120 litres per hour and hydrogen was fed at such a rate (225.1 per hour) that the pressure was maintained at 200 atmospheres. At both temperatures the dry reaction product was a colourless mobile oil of which over 60 per cent. by weight distilled below 200° C., *i.e.*, in the motor spirit range. The increase of temperature from 480° to 495° caused an appreciable increase in the extent of cracking, the dissolved gas, which was mainly (by weight) paraffin hydrocarbons, increasing from 6.3 to 10.6. The yield of dry oil was correspondingly less by 7.5 per cent. by weight.

Production of Toluene

The experiment on creosote was conducted in the same manner except that it was necessary to preheat the feed gear to prevent separation of naphthalene, etc. The same catalyst was used but the temperatures were increased by about 15° to 495° and 510° C. and more hydrogen was supplied. At both temperatures the product was a water-white mobile oil. The increase of temperature from 495 to 510° C. increased the yield of spirit, but the additional cracking also increased the amount of gaseous hydrocarbons formed and reduced the yield of dry oil from 92.4 to 83.1 per cent.

It has already been indicated above that there may be many processes which can utilise fractions of either high- or low-temperature tar. For example, the production of toluene from tar acids or from the cresol fraction of tar acids has already been referred to. No one of these processes is likely to utilise a large quantity of tar but they are nevertheless each of interest to the industry in that they can collectively improve the tar market.

The production of toluene is particularly interesting since we are informed that there is at present a shortage of supplies of this substance. Toluene can be prepared by a variety of reactions involving hydrogenation either at atmospheric pressure or at high pressure. At atmospheric pressure cresol is the only substance from which it can be obtained in good yield. Any of the three cresols can be converted to toluene by passage of cresol vapour over a molybdenum catalyst supported on active charcoal. The yield of toluene is 82 per cent. by weight. The time of contact is very short (0.5 sec.) so that the plant necessary for the production of toluene should be of small size. During the reactions a small amount of carbon is deposited and it has been necessary to search for a support alternative to charcoal. One has now been found. Since tar acids from high temperature tars contain about 25 per cent. of cresols these should form a relatively cheap source of raw material for the production of toluene. The hydrogenation of tar acids with a molybdenum catalyst under pressure requires careful control of experimental conditions if toluene is to be produced preferentially. The best yield which has so far been obtained is the production of a distillate equal in volume to the raw material and containing 20 per cent. of toluene. Further research would undoubtedly lead to better yields.

Swedish Paper Pulp Industry

Decline in Exports

THE "Swedish Economic Review" for September states that the seasonal improvement in economic conditions which normally sets in during the second quarter of the year did not occur during the current year, the economic position undergoing a further, though not marked, deterioration. Thus the decrease in employment was inconsiderable when compared with the first quarter, but an appreciable decrease was shown in comparison with the preceding year. After the strain imposed on the Swedish banking and money markets in connection with the Kreuger crash, the position eased fairly rapidly. The Swedish krona, which underwent a considerable deterioration during April, stabilised itself during May at a sterling rate of about 19.50 and at a dollar rate of about 5.30.

The sales of paper pulp during the last few months have been small. In spite of the strike which has been in progress ever since the beginning of April (at certain factories since the end of February), which will reduce the estimated production for the present year considerably, prices have in general been weak. An exception is provided by sulphate pulp, however, which shows appreciable stability in prices. The hoped-for increased liveliness of the paper market did not materialise. It has been possible to continue shipments in spite of the labour conflict, although only to a limited extent. The considerable decline in pulp exports which made its appearance during the second quarter in comparison with the corresponding period of 1931, must, however, be partly ascribed to the increased depression, and to accelerated shipments during the first quarter in view of the fears of a labour conflict. Recent developments appear from the following table (in thousands of tons dry weight).

	April—June 1931	April—June 1932	Jan.—June 1931	Jan.—June 1932
Sulphite pulp	169.7	74.0	253.0	180.9
Sulphate pulp	104.3	70.5	155.1	131.4
Mechanical pulp	64.8	38.5	92.2	61.6
Total	338.8	183.0	500.3	373.9

At the end of July, quotations of North European port were approximately as follows: bleached sulphite £9 15s. to £11, strong sulphite £6 17s. 6d. to £7 15s., and strong sulphate $1.50 ex dock U.S.A. For wet mechanical pulp a c.i.f. price of £1 18s. to £2 was quoted, and for dry mechanical pulp 75 to 80 kr. f.o.b. West Coast port.

Details of the Ottawa Agreements

Canadian Preference for British Chemicals

DETAILS of the agreements made at the Ottawa Imperial Economic Conference in July—which had been temporarily withheld at the request of the Dominions—were issued on Wednesday night and filled a Blue Book of 94 pages. The tariff concessions to Great Britain include the entire abolition of certain duties, increased preferences in other cases and, in some instances the imposition of duties on foreign articles. The agreement with Canada includes valuable concessions to British chemicals, iron and steel. Following are extracts from the schedules attached to the trade agreements.

Canada

In the following schedule of chemicals in the Canadian agreement two rates of duty are given for each article, the first being the British preferential rate and the second the general rate.

Chemical compounds composed of two or more acids or salts soluble in water, adapted for dyeing or tanning	Free : 10%
Aniline and coal tar dyes	Free : 10%
Bacteriological products or serum for subcutaneous injection	Free : 20%
Blood albumen	Free : 10%
Sal ammoniac and nitrate of ammonia	Free : 25%
Oxide of cobalt	Free : 10%
Bichloride of tin and tin crystals	Free : 10%
Sulphate of copper (blue vitriol)	Free : 10%
Sulphate of iron (copperas)	Free : 10%
Cream of tartar in crystals and tartaric acid crystals	Free : 10%
Phosphorus and compounds thereof	Free : 20%
Oxalic acid	Free : 20%
Oxide of tin or of copper	Free : 15%
Sulphate of zinc and chloride of zinc	Free : 20%
Bisulphate of soda or nitre cake	Free : 20%
Calcium chloride, not in solution, for road-treating purposes only	Free : 15%
Xanthates, cresylic acid and compounds of cresylic acid, used in the process of concentrating ores, metals or minerals	Free : 15%
Ethylene glycol, when imported by manufacturers of anti-freezing compounds to be used exclusively in the manufacture of anti-freezing compounds, in their own factories	Free : 15%
Bichromate of potash, crude ; red and yellow prussiate of potash	Free : 15%
Peroxide of soda ; silicate of soda in crystals or in solution ; bichromate of soda ; nitrate of soda or cubic nitre ; sulphide of sodium ; nitrate of soda ; arseniate, binarseniate, chlorate, bisulphite and stannate of soda, prussiate of soda and sulphite of soda	Free: 20%
Sodium, sulphate of, crude, or salt cake, per lb.	½ ct. : 3-5 cts.
Chloride of aluminium, or chloralum	Free : 10%
Sulphate of alumina or alum cake ; and alum in bulk, ground or unground, but not calcined	Free : 15%
Stearic acid	Free : 20%
Other acids, not produced in Canada	Free : 25%
Phosphoric acid	Free : 25%
Nitric acid :	Free : 22½%
Sulphuric and muriatic acids	Free : 25 cwt.
Acid phosphate, not medicinal	Free : 25%
Sulphuric ether and chloroform	Free : 25%
Non-alcoholic preparations or chemicals	5% : 25%
Soap, common or laundry, per one hundred pounds	50 cts. : 1.50 dol.
Castile soap, per pound	Free : 2 cts.
Glue, liquid, powdered or sheet, and gelatine	17½% : 25%
and, per pound	2 cts. : 5 cts
Vegetable glue	10% : 35%
Gelatine, edible	10% : 35%
Perfumery	20% : 40%
Surgical dressings, etc.	12½% : 35%
Ultramarine blue, dry or in pulp ; whiting or whitening ; Paris white and gilders' whiting ; blanc fixe ; satin white	Free : 10% ; 10%
Litharge, other than for battery purposes	Free : 15% ; 15%
Dry red lead and orange mineral ; zinc oxides, such as zinc white and lithopone	Free : 15% 15%
Gums, viz. : Amber, Arabic, Australian, copal, damar, elemi, kaurie, mastic, sandarac, Senegal, tragacanth, gedda, and barberry ; gum chicle or sappato gum, crude ; lac, crude, seed, button, stick and shell ; ambergris ; Pontianac	Free 15% : 15%
Ochres, ochrey earths, siennas, and umbers	5% ; 15% ; 15%
Varnishes, lacquers, japans, japan driers, liquid driers, and oil finish, n.o.p., per gallon	20 cts. ; 20 cts. ; 20 cts. and 15% ; 25% ; 30%
Putty of all kinds	17½% ; 27½% ; 27½%

Australia

The agreement with Australia provides that United Kingdom goods shall enjoy certain minimum preferences graded according to the duties chargeable upon them. The formula is as follows :—

When the duty on United Kingdom goods is : Free to 19 per cent. ad valorem : 19 per cent. to 29 per cent. ad valorem : over 29 per cent. ad valorem. The minimum margin of preference will be : 15 per cent. ad valorem : 17½ per cent. ad valorem : 20 per cent. ad valorem.

The formula is subject to the proviso that the 20 per cent. margin of preference is not to be applied so as to result in a rate of duty exceeding 75 per cent. ad valorem. This formula is not of universal application, but is subject to certain exceptions. Australia is also to abolish as soon as practicable the existing prohibitions on the importation of certain goods from the United Kingdom. Some have already been removed.

New Zealand

All duties on United Kingdom goods are to be immediately reduced, the surtax representing an average duty of 5 per cent. being abolished. In addition there are to be modifications of the basic import duties that will be of benefit to the United Kingdom in regard to confectionery, apparel and ready-made clothes, hosiery, and silk and artificial silk piece goods.

South Africa

New or increased margins of preference are to be allowed on certain classes of goods from the United Kingdom. There are substantial reductions in some duties. The new preferences are on articles that include electric vacuum cleaners, cranes, mechanical excavators, etc., locomotives, typewriters, tractors, radio apparatus, and toilet soap. In some cases a preference is created by the imposition of duties on foreign goods.

Newfoundland

Preferences of approximately 10 per cent. ad valorem as from July, 1933, are introduced on many classes of goods. From the same date new and more favourable conditions for the United Kingdom in regard to the valuation of the pound sterling for Customs purposes.

British India

Preferences are introduced on a large number of goods amounting to 10 per cent. ad valorem except on motor vehicles and parts, which will receive 7½ per cent. ad valorem. These preferences are on goods that include certain chemicals and chemical preparations, metal alloys, paints and colours, paper and pasteboard.

THIO TINON BLUE 3R, which has just been introduced by The Geigy Colour Co., Ltd., has the good fastness properties characteristic of the Thio Tinon Blues series. It is distinguished chiefly by its much purer and clearer shade, and can be used for the same class of trade as the older brands. In combination with the older brands, it is possible to obtain any desired variation of navy blues from a greenish to a reddish cast on cotton and artificial silk piece goods and yarns of every description. When dyeing piece goods it is preferable to work on the jigger by the sodium sulphide-hydrosulphite process when previous boiling out of the goods can in most cases be avoided. Thio Tinon Blue 3R is also suitable for the dyeing of silk, particularly silk yarn, when it is necessary to add 70-140 grains per gallon or 1-2 grams per litre of glue as a protective colloid. These dyeings are fast to degumming and withstand a subsequent bleaching with hydrogen peroxide.

A Group Sales Organisation for Canadian Trade

Dr. E. F. Armstrong's Proposal to the A.B.C.M.

THE sixteenth annual general meeting of the Association of British Chemical Manufacturers was held at the Chemical Society's Rooms, Burlington House, London, on October 6, under the chairmanship of Dr. E. F. Armstrong. Extracts from the annual report presented at the meeting were published in THE CHEMICAL AGE of October 1 (pp. 307-308).

DR. E. F. ARMSTRONG, in moving the adoption of the report, paid a tribute to the memory of Lord Trent, the Right. Hon. J. W. Wilson, Sir Richard Threlfall and Sir William Pearce, whose death was recorded in the report, and of Mr. John Gray, another signatory member, whose death had occurred since the period under review.

There were two items in the report, he said, which proved conclusively the value of the co-operation secured from a strong and comprehensive organisation such as the A.B.C.M. He referred to fiscal policy and patents. Since the Import Duties Act came into operation, they had been fortunate in securing the adoption of most of their recommendations in regard to additional duties and the Free List. Their success in obtaining additional duties had been due to the fact that within the Association they included not only makers, but also important users of many chemical products. Thus an agreed recommendation submitted by the Association carried great weight in that the Import Duties Advisory Committee appreciated that it was supported by important consuming interests and was not therefore likely to harm those interests, and was not merely a request of those who made the product. These agreements were secured after assurances had been given by producers that they would not utilise the tariff to exploit the consumers. These promises had been loyally observed, and he felt that decisions on tariffs had been secured in the Association with far greater ease and goodwill than in most other organisations. Recommendations submitted with the prior concurrence of users had far more chance of success than proposals made by makers alone, and opposition from consuming interests could be more easily overcome with the help of the Association before a case for an additional duty was submitted than it could be after the Import Duties Advisory Committee had advertised the case.

On the question of patents the report spoke for itself. The amendments secured in the Patents and Designs Bill were only possible because of the rapid and energetic action initiated and taken by the Association with the support of the other chemical organisations. In the debate Dr. Clayton did yeoman work for them.

Fruits of Ottawa Conference

Referring to the Imperial Conference at Ottawa, Dr. Armstrong said that quite apart from the substantial preferences given by the Dominions, and from the amelioration of customs regulations, surcharges, dumping duties and the like, Ottawa had been a great success because of the new spirit of Empire co-operation engendered. To his mind this Ottawa spirit was of even greater value than all the practical concessions and agreements, and it behoved them not only to utilise it to the full but to foster and develop it in every way. It must not be imagined that Ottawa was the last word. It was only the beginning of an era of steadily increasing economic co-operation within the Empire, and machinery had been established for making those adjustments which were essential in any vital and progressive policy. Increased trade would not come from Ottawa of its own volition. They must fight hard against those who would have to be dispossessed and who would not relinquish the Dominion markets without a bitter struggle.

Canada had a well-established chemical industry of its own. It intended to continue this and to project it when necessary, provided that it could be shown that the particular manufacture was economic. Canada had no desire to manufacture everything or to enter light-heartedly on new manufactures under the shelter of a tariff, and she was willing to give a high preference to British chemicals in such cases.

British Capital in Canada

Canada would undertake the manufacture in the future of chemicals which new discoveries or requirements rendered suitable for her to make, and it was accordingly up to British enterprise to see that such ventures were at least in part financed with British capital. Canada was ready to buy British, but that implied the readiness of Britain to sell to her at competitive prices and to give what was understood by the term "service."

On account of its proximity to the United States, the Canadian market was a difficult one, since it was easy there to obtain quotations on the long distance telephone and prompt shipment of goods from the American stocks or factories. Further, it was easy and inexpensive to send high class representatives and technical experts from America in cases of complaint. It was probable that Canadian buyers got an even better service from America than was given to American buyers, and such was likely to happen in the immediate future as the Americans would not give up the Canadian market without a bitter fight. In consequence, the Canadian buyer was definitely spoilt, even to the extent of demanding a little more than was fair. The Canadian market, generally speaking, was too small to take a large line of any one chemical, and therefore there was little room in it for competitive effort by several British manufacturers.

A Definite Proposition

He made the definite proposition that they should enter it as one sales organisation, representing a number of houses who would sell to it on an agreed basis approximately to cost, and share in the expenses and profits according to their respective turnover or other convenient plan. That was not the place to elaborate any detailed scheme, but a satisfactory one was feasible and not too difficult to work out among willing participators. One such organisation was already in being in the form of Canadian Industries, Ltd. Another was required for the fine chemical industry, and perhaps a third at a later date for those miscellaneous chemicals which did not fall into the other group. The advantages of such a central organisation were obvious. Some of them might be enumerated. It would form a centre from which British chemicals could be obtained by any Canadian buyer without being put to the present trouble of having to find out which particular British firm to approach. It would be able economically to effect collective advertising of the kind which appeals to Canadians. It was useless to use British advertising copy in Canada on account of the different mentality.

It would be able to secure the services of a highly competent staff, which was preferable to any agency, however good, who would be much more closely in touch with Canadian needs and conditions than the present system of individual representation allowed. Further, it should effect economies in representation while making such representation really thorough in all parts of the country. The local management must be given a great measure of authority than was granted to-day to representatives or agents by boards at home, who often had no first-hand knowledge of Canadian requirements. A conflict between the agent and the home board was most detrimental to the chance of doing business. Correspondence between agents and clerks in England who had never been abroad had been known to produce much friction; it should always be seen by a principal.

A Central Organisation

A central organisation would get over the question of keeping stocks and of giving prompt delivery much more efficiently and economically than at present; when products were dutiable, they could be kept in bond and be withdrawn only when required. The head of a Canadian organisation would be of sufficient status to meet the principals of the buying firms, which was a most important factor in Canadian business. Otherwise an England partner should visit Canada in alternate years—an expensive trip. A central organisation carrying stocks and ordering only to replace these would avoid the present expensive mistakes in shipping and the charge for cables. It was a commonplace that agents were prone to accept orders for impossibly close delivery, but it was the only way they could secure the business in compe-

tition with America. A central organisation, once established, would be able to launch new lines at a minimum of expense.

Empire markets must be entered boldly if at all, with a good deal of initial expenditure, otherwise they were best left alone. This was the best moment to begin to attack them, with the possibility that the depression had ended and with the knowledge that the British goodwill arising out of Ottawa, together with the concessions secured, would be of enormous help in building up the new organisation and ousting the foreigner.

In a similar way the sale of chemical plant in Canada could only be effected by a combined group. Here the difficulties were even greater, as only a portion of the chemical plant required was standard, a great deal being specially designed for the particular job. The problems of spares, or starting up, of alterations, all proved almost insoluble to the individual firm, but it should be possible to tackle them through a group organisation. It was fundamentally wrong to leave this market to the United States and to contemplate the existence of growing chemical and allied industries in Canada mainly manufacturing with American-built plant. Canada had to million population to-day; it might easily double this on the next wave of prosperity, and now that most of the pioneer work in the way of building railways, roads and cities had been accomplished, the way was cleared for quicker industrial development. The same probably applied to Australia, though there, he believed, the basic conditions of climate and natural resources were not quite so favourable as in Canada.

Foreign Markets

The arguments in regard to Canada applied also to certain foreign markets, where in the past they had not secured the amount of trade they ought to have. They had recently had a report regarding the need for a co-operative selling organisation in regard to fine chemicals, drugs and medicines in South America, in which it was stated that business, to be effective, must be from the manufacturer himself, based on competitive prices, direct to the importer, and to realise and effect this in an efficient manner there must be a fairly competent organisation both at home and abroad completely conversant with the trade, the customs, the language and the mentality of those markets.

The South African drug and fine chemical market afforded a good example of what a strong central organisation could achieve. It was said to be almost entirely in the hand of one firm, representing the great Continental producers, which was able to give a service and to keep stocks far in advance of any smaller British competitor. In general, selling in the Empire was far more a personal matter than at home. Orders went to acquaintances or to friends in preference to strangers. The telephone had largely replaced the letter, and a letter from a stranger overseas was no longer a good business getter.

Future Work of the Association

Speaking of the future work of the Association, Dr. Armstrong said obviously the Association as at present constituted could not trade, but it could hold the ropes and sponsor the formation of other associations to effect this purpose. Such matters as traffic rates had been long part of its routine. Should it extend to group insurance, to collective buying? To the smaller firms the advantages of such action far outweighed the disadvantages. They had this year made a start with the co-operative insurance of railway wagons. This idea might be extended.

The Association had been eminently successful in defence; should it not also increase its efforts in offence? He did not advocate, of course, that the Association should tread the stony paths of salesmanship, but he considered that the industry must work much more as a whole, in large groups and not in individual units. They appreciated and admired the organisation built up by Imperial Chemical Industries to secure an adequate share of the world trade. The substances already covered by that organisation were sufficient to engage its attention, leaving a large field to be covered by the other chemical firms. Whilst the individuality of these should be maintained, when it came to entering Empire and world markets some form of central marketing organisation was desirable.

It was clear that some of the Dominions intended to have a chemical industry—a fact appreciated and wisely fostered by Imperial Chemical Industries. It was in the interest of chemical manufacturers in this country to take a hand in this development. They were in the best position to decide when it was or was not economical, and they alone would afford the initial technical advice and assistance which would save unnecessary initial expenditure. Should they not make the Association really British and encourage the formation of self-governing sections in the Dominions, maintaining as close a touch as distance allowed and working at all events to a general policy agreed with themselves? Such a state of affairs would be surely far preferable to the existence of a rival Association in a Dominion, formed to uphold the Dominion industry against chemical manufacture in Great Britain.

The Position of Fine Chemicals

Dr. F. H. Carr (British Drug Houses, Ltd.) in seconding the adoption of the report, said as one concerned in fine chemical manufacture, he wished especially to thank Dr. Armstrong for his boldness in indicating the imperative need of taking action in the direction of forming a joint selling organisation. The need for some such organisation had been frequently discussed, but the chairman exhorted them not merely to discuss its wisdom, but to take immediate steps towards its realisation. Obviously in doing so, there were many inherent obstacles to meet, but with goodwill, seemingly insurmountable difficulties could usually be overcome. Such a sales organisation necessarily had its repercussion on the productive side of every manufacturing concern involved, and it seemed to him that rationalisation of manufacture would of necessity have to accompany, if not actually to precede, any successful effort at joint selling.

Those concerned with the production of fine chemicals were repeatedly told by the salesmen that what they wanted was that everything they sold should be made by their particular company, the reason given being that customers demanded it. If they retorted that the number and variety of fine chemicals was such that a much greater variety of skill, experience and knowledge was required for their production than could ever be concentrated in one manufacturing concern, the reply was that they could not help that; they could only sell to advantage goods of their own manufacture. Considerations of quality and price being the basis of competitive selling, salesmen must be fully armed in these respects. Were they able to prepare the way so that the British mark stood for such excellence of quality as will satisfy this demand? His answer was "Yes," but only by rationalising their industry and raising efficiency to the highest point.

More than One Organisation Necessary

The inevitable effect of forming joint selling organisations, and he put it in the plural because it seemed to him that the fine chemical industry would require more than one organisation for the different sections of its activities, would be to compel them to solve some of the difficulties of inefficiency, high costs, confusion, price-cutting and ignorance of the best methods of manufacture, which resulted from the present uncontrolled competitive methods to which he had referred. If by its effects they could only lessen the present anomalies and overlap in manufacture, the formation of such a sales organisation, however well it might achieve its main object, would be still better justified by its total result.

Mr. E. V. Evans (South Metropolitan Gas Company), hon. treasurer, commented on the accounts and the favourable state of the Association's finances.

A full discussion on co-operative selling ensued in which Mr. K. H. Wilson (Albright and Wilson, Ltd.), Dr. P. C. C. Isherwood (W. J. Bush and Co., Ltd.), Mr. F. M. Roberts (A. Boake Roberts and Co., Ltd.), Mr. A. A. King (Albright and Wilson, Ltd.), Dr. G. C. Clayton (Imperial Chemical Industries, Ltd.), Mr. A. C. Wilson (Distillers Co., Ltd.) and Major T. Knowles (Monsanto Chemical Works, Ltd.) took part. These speakers expressed their appreciation of the constructive proposals made by the chairman, and, while realising the many difficulties involved and the allied aspects indicated by Dr. Carr, urged that the problem of co-operative selling be carefully studied by the Association in view of its importance to British trade.

The Salaries of Chemists

By HENRY T. F. RHODES

FROM time to time there appear in the Press complaints regarding the salaries paid to chemists. The British Association of Chemists, which naturally has considerable experience of professional economic conditions, is therefore in a position to view the question from the widest possible point of view. Its findings should be of some interest to chemical men. It is commonly said, and it is true of the chemical profession as of other occupations, that there is room at the top. Certainly it is true that the salary of a chief chemist of any large organisation may range from £1,000 to £3,000 per annum. It has not in any case been the experience of the Association that £250 per annum is a common *maximum* for a chemist. For work of reasonable responsibility even in comparatively small organisations a salary of £500 to £950 is not uncommon. The young graduate and sometimes even the student who is in the process of graduating can command a salary of £250 per annum. The research student who has done good post graduate research can command more. For qualified men 27 to 28 years of age, the Association can often secure appointments at salaries of the order of £450 to £500 per annum.

No Standardisation Possible

But when considering salaries, it is important to remember that no mechanical view of remuneration for scientific work is possible. The more specialised and scientific the individual's occupation the less can he afford to consider a minimum salary. A minimum salary implies a maximum which may, and probably will, be fixed relatively close to it. The scientific man has to consider his remuneration in terms of what he is worth. His work is not and never can be standardised and this necessarily also applies equally to his remuneration.

There is certainly a type of employer who judges the matter on the principle of supply and demand, and will have it that chemists are available (as they say) at "two a penny." Such men show a profound ignorance of the real function of the scientific instrument. It may well be said at once that it is not possible to obain efficient scientific service in such terms. It is a notorious fact that highly paid scientific service pays for itself over and over again, but that an inadequately paid and equipped staff is almost useless, if it is no worse. Owing to the greater responsibility attaching to it, an error in scientific work is attended with much more serious consequences than one made by an operative or clerical worker. This is denied only by those ill acquainted with scientific work. Consequences of error are not less serious because they are more difficult to trace and isolate.

The Basic Principle

These very facts are often incompletely appreciated by the chemist himself. It cannot be too strongly emphasised that they have a direct bearing upon the matter of remuneration from the chemist's point of view. However elementary the work he may at first have to undertake, the chemist essentially works with his brain and his true function is to develop ideas and put them into practice. That is the basic principle of all applied science. The individual able to do this has a definite value for the employer. In most cases it requires only common sense to form a fairly accurate estimate of what that value is. It is for the chemist to convince the employer on this point.

This is no theoretical consideration. It is the experience of the Association that it is applied in practice every day. In times of depression it is borne in all the more strongly that new ideas, closer scientific applications are necessary. It is obvious that if an individual acquiring a salary of £600 per annum is capable of making for an organisation an additional £2,000 per annum or saving a like sum his engagement at that salary is profitable. This is the only point of view which should interest either the chemist or the employer. Both will say in effect, "How much is the business going to be worth to me?"

It is the experience of the Association that the chemist who approaches the matter from this point of view can nearly always command a salary commensurate with his abilities, and it is for this reason that salaries commanded by members of the Association are on an average higher than those obtained without the Association's backing.

The Association's backing in an important element. Through its appointments bureau the Association has collected a great deal of data which are at the disposal of its members. It can and does advise chemists regarding the conditions of particular industries, and the potentialities in various departments of work. The chemist may not know these himself though he may be fully able to take advantage of the knowledge thus gained. Armed with this knowledge and confidence in his ability to do the work, he is in a position to negotiate for an adequate salary.

The fact must be fully realised that negotiating an appointment is as much a business transaction as selling machinery or soap. From considerable experience the Association has irrefutable evidence that the appointment does not always go to the lowest bidder. No sensible person buys an article merely because it is cheap. Many of the worlds present calamities are due to the ignoring of this elementary maxim of common sense.

The Matter of Agreements

But despite this fact the tendency to consider the lowest bidder is not uncommon, and it is in this regard that membership of the Association is essential for the chemist. The tendency to undercut is often due to lack of knowledge of the conditions governing particular appointments. It thus frequently happens that non-members of the Association who bid for an appointment with the inducement of low remuneration not only fail to obtain the appointment themselves but prejudice others; for despite the preceding observations there will always be a tendency where applications are numerous and the price placed upon services vary, for the employer to accept the lowest *likely* to be compatible with efficiency, and take the risk. The remedy for the chemist is obvious; membership of the only organisation qualified to advise him in the matter of salary.

Out of this and other conditions of service arises the matter of agreements. On acceptance of appointment it is well always to insist at least upon a letter of engagement. It is still not fully realised that in the absence of a specified clause in agreement, a letter to the contrary, the chemist is entitled to three months notice while he for his part must give three months notice in like circumstances. After consultation with the Legal Aid Department and upon its advice this issue has been supported by the Courts in the cases of Madden v Holland in the Mayor's and City of London Court, June 17, 1926, Haig v Hailwood and Ackroyd at Leeds Assizes, March 25, 1930, and in the case of Young v Manbre and Garton, at the West London (Brompton) County Court, December 19, 1930.

The Legal Aid Department is further able to give expert advice upon all matters relating to service agreements. A large number of members whose agreements have been viewed by the Department before signature have been in a position to negotiate in the matter of inequitable or ambiguous clauses which would have passed unnoticed without this guidance.

The Department further advises in matters of alleged breach of agreement. Two notable cases in this connection have been Arrowsmith v London and Rhodesian Mining and Land Co., King's Bench, July, 1930, and Green, also Marsden v British Celanese, King's Bench, June, 1932.

These examples take no account of successful issues in matters which have been settled out of court. They have been very numerous. In this connection it should be borne in mind that in the matter of notice three months is the minimum period. Six months has very commonly been made the basis of successful negotiation.

An Inevitable Lack of Knowledge

Correspondents in the Press not infrequently point out that the chemist's knowledge of matters relating to adequate salary, service agreements and kindred matters is lamentably restricted. This is quite true but it is also inevitable. The chemist has neither time nor opportunity to give these matters

close attention. An organisation which by reason of its special functions and growing deposit of experience is necessary to supply the chemist with information which he cannot easily acquire himself but which is nevertheless vital to his welfare.

The intellectual worker in industry as in other spheres of life is necessarily to some extent isolated. He wishes rightly, in the abstract, to work out his own salvation. This characteristic is particularly strongly developed in the scientific man, and it is an attribute of immense value to civilisation. But such strongly marked individuality is not incompatible with the highest expression of co-operative effort as the immense progress scientific research—impossible without co-operation—clearly indicates. For the successful presentation of every day affairs a like co-operation is necessary.

From the foregoing review it will be evident that in the economic sphere alone the British Association of Chemists has achieved a great deal. This has been done in fourteen years with a membership which still remains a little short of 2,000. Representative as it should be of some 10,000 chemists estimated to practice as such in Great Britain, the economic advances made would have been incomparably greater to the advantage of the whole profession and of industry.

There remains a tendency to underestimate the importance of acquainting the public with the work of the chemist. On a last analysis it is the public which calls for chemical service and a clear understanding of what this implies is to the benefit both of the community and the profession. A body representative of all chemists can more readily and with greater authority disseminate such information than any scientific society with academic aims. Even with its comparatively limited membership the Association has done a great deal of work in this direction. Its effectiveness has increased directly in proportion to its numerical strength.

Chemicals at the Shoe and Leather Fair

A Wide Range of All-British Products

CHEMICALS used in the tanning, dyeing and finishing of leather were prominently displayed at the Shoe and Leather Fair, at the Royal Agricultural Hall, London, October 3-7. About thirty-five firms were represented in the raw materials section of the Fair.

British Cellulose Lacquers, Ltd., exhibited a remarkably complete range of finished leathers of every description which testified to the rapid advance made in recent years by the research department of this firm, and there will be few readers who have not now learned that they may rely on these all-British products.

The Clayton Aniline Co., Ltd., are manufacturers of "Bursoline" sulphonated cod oils, which are very well-known to tanners at home and abroad. This product is made in several grades to suit all kinds of tannages in both light and heavy leathers. The oil is always of uniform quality, and consumers know that they can rely upon it. The company also manufacture aniline dyestuffs for dyeing and staining all classes of leather. The range of "Neolan" colours are suitable for washable glove leathers, being absolutely fast to light and washing.

W. R. Earp and Co. have long been associated with the production of sulphonated and emulsifying oils for tanners and light leather manfacturers. Their FCX bleaching and clearing oil has the experience of 25 years behind it, and this firm claims that its use supersedes bleaching extracts and produces better and stronger leather. For light leathers, and especially where dyeing light colours are required this oil produces a light coloured base upon which to fix the dye.

B. Laporte, Ltd., are also well known to the tanning and allied trades, as manufacturers of sodium sulphide in the concentrated (solid, broken and flake) and crystal forms. The high quality of "Laporte" brand sodium sulphide has been still further improved by special processes which ensures a uniform product of exceptionally high grade, particularly suitable for tanners, artificial silk manufacturers and dyers. Other products manufactured by this firm are pyrophosphate of soda in crystal and anhydrous forms, sodium bisulphite, powder and solution, barium sulphide, hydrogen peroxide and other bleaching agents.

Peter Spence and Sons, Ltd., made a special feature of titanium potassium oxalate. It was not until titanium potassium oxalate (known in the leather trade as "T.P.O.") was introduced on the market by a British manufacturer that he possessed a product capable, not only of acting as an effective mordant in the fixation of basic colours, but also of producing, by direct application, a range of extremely fast yellowish-brown shades without the use of additional dyestuffs. During recent years the value of T.P.O. has received increasing recognition in the leather dying industry both at home and abroad, and there are to-day few countries in the world where T.P.O. is unknown. It may safely be said that it is an indispensable factor in the economical production of rich fast colours, and that by its aid a levelness of shade can be produced which is unobtainable by the use of coal tar colours alone. Employed in conjunction with natural dyestuffs (such as fustic, logwood, sumach, etc.) and with coal tar colours, T.P.O. has rendered possible the production of colour shades of a remarkable permanency and stability. Its advantages when dyeing blacks on alum and chrome tanned leathers are also now widely recognised.

John and James White, Ltd., the Scottish chemical manufacturers, are familiar to chrome leather producers in many parts of the world. They have specialised in the manufacture of chromium compounds in all forms for many years. Of particular interest to the leather trade are their chrome tanning extracts in liquid and solid form. These are readily soluble in water, and uniformity in composition is always assured. "Chrometan" compounds are extensively used in the trade for both full and semi-chrome work, and samples are at the disposal of prospective users. This firm also supplies bichromate of soda, potash and ammonia, as well as chromic acid of 99.5 per cent. strength.

The Dyestuffs Group of Imperial Chemical Industries, Ltd., exhibited dyestuffs for use of all types of tannages, chrome liquors and chrome sulphate for the chrome tanning of leather, as well as Kromolines for "oiling-off," drum oiling and fat-liquoring. Kromolines are sulphonated cod-oil products for use on leather and were originated by Levinstein, Ltd. An entirely new product shown for the first time is Xeran Glazing Finish A. This product is intended for use as a "season" for conditioning dyed chrome leathers, either alone or in conjunction with pigment finishes. After glazing under the jack the leathers have a fine clear glossy surface which shows no tendency to cracked glaze.

Among other exhibitors were Bowmans (Warrington), Ltd., the British Dyewood Co., Ltd., The Hexorax Co., Ltd., I. G. Dyestuffs, Ltd., Nobel Chemical Finishes, Ltd., Chas. Page and Co., Ltd., Williams (Hounslow), Ltd., Pancreol, Ltd., and the Yorkshire Dyeware and Chemical Co.

United Indigo and Chemical Co.

Return of Capital

FOLLOWING the announcement at the last meeting of the United Indigo and Chemical Co., Ltd., that the directors had under consideration returning to the shareholders a proportion of the moneys representing investments outside the business, it has been decided that, without any detriment to the business, a sum of £95,000 can be distributed as return of capital. The directors accordingly propose that this shall be done by returning to the preference shareholders 5s. per share on each of the issued shares held, thus reducing the preference shares from 12s. 6d. to 7s. 6d., and by repaying to the ordinary shareholders 1s. 4d. per share, thus reducing the issued ordinary shares from 3s. 4d. to 2s. The unissued ordinary shares are to become 2s. shares and the capital increased to the present figure of £300,000 by the creation of 950,000 new shares. It is not intended at present to make any new issue. The necessary meetings will be held in Manchester on November 2.

Fluid Friction and Heat Transfer

Some Points in the Design of Heat Exchanges

The following extracts are taken from a paper read at a meeting of the Institution of Chemical Engineers, on Friday, October 7, when Mr. J. Arthur Reavell, past president of the Institution, presided. The author, Mr. C. M. White, dealt primarily with certain methods by which heat transfer coefficients may be predicted from fluid friction data.

THE efficiency of a heat interchanger, that is the fraction of the available heat actually transferred, is not primarily influenced by the size of the plant, but depends very largely upon the geometrical proportions of the design. A fire tube boiler, for example, having long tubes of small diameter is more efficient than one having short tubes of large diameter, even though both have the same total area of heating surface. If attention be confined to geometrically similar plants, that is to plants of essentially constant efficiency, which is strictly true only if the comparison be made at such speeds that the fluids flow along geometrically similar paths, then their size is determined by the energy available for overcoming fluid friction. The heat transferred per unit of area increases with the speed with which the fluid moves past the surface, so, in theory at any rate, reduction in size may be offset by increase of speed. The size of the plant to transfer a given quantity of heat may thus be reduced, and theoretically the only limit to the reduction in size is that the fluid speeds must not approach that of sound, but if an attempt be made to reduce capital outlay in this way then a conflicting factor becomes apparent. Power is required to move the fluids over the surfaces, and there must always be some point beyond which the extra capital cost of the faster circulation more than offsets the economies of reduction of the heating surface.

A satisfactory compromise has therefore to be found between too great pumping losses on the one hand and too small a heat flow per unit area on the other. Sometimes there may be overruling factors such as mechanical strength or satisfactory operation, but these will normally be peculiar to particular types of plant, whereas the conflict between size and pumping loss is present in all heat interchangers.

Basic Area of Reynolds's Analogy

The first step in design, if this is to be on sound lines, must involve a study of both fluid friction and heat transfer coefficients. These two variables can be regarded as quite separate, each being estimated independently from the accumulated experience of past design. In such estimation it will usually be most satisfactory to obtain the numerical data from tests of actual plant; though in expressing this data use will be made of laws formulated from the wider range of experimental academic investigations. Considerable advantage, however, is gained by making a single study of the two variables, for by so doing Osborne Reynolds's theory that the transfer of heat and the transfer of momentum are caused by closely analogous process can be utilised.

When a fluid flows past a fixed wall, the molecular layer next to the wall may be regarded as not moving along the wall. More distant layers, however, do move, and in the main their motion is parallel to the boundary. Experiment shows that the farther a layer is from the boundary the faster it moves, until well out in the stream some point is reached at which the velocity is a maximum. A typical example of this occurs in the distribution of velocity near a flat glass plate supported in the centre of a wind tunnel. Even with an optically smooth surface there is no measurable slipping of the fluid at the surface itself, and the retarding influence of the surface extends a considerable distance into the main body of fluid. In this case the retarding effect of the walls may be explained by the assumption that molecules which have been in contact with the wall have lost the momentum they originally possessed in the direction of the general flow. These molecules pass to layers moving at higher velocity and so tend to retard them. In exchange the fast layers lose molecules which are ultimately retarded at the walls.

Any molecular interchange between two layers moving with different speeds tends to slow up the faster layer and to speed up the slower. The loss of momentum of the one is equal to the gain of the other, and is proportional to the mass interchanged and to the velocity difference of the layers. According to the kinetic theory of gases, the mass interchanged per unit area by molecular movements, is in effect inversely proportional to the distance between the layers and otherwise depends only upon the structure of the fluid. This leads to the definition of viscosity μ in the form:—

$$f = \mu \cdot \frac{dv}{dy}$$

where f is the tangential drag per unit area between two layers, dy apart and moving with a difference of velocity dv. While, to agree with this definition, the viscosity μ should be regarded as the experimentally observed drag on unit area at a point where unit velocity gradient exists, yet from the heat transfer point of view it is perhaps more helpful to regard μ as the mass per unit and area which is interchanged by molecular action between layers unit distance apart. From the dimensional point of view this is the more logical definition of μ, for it has the dimensions of a mass divided by time and length.

Mass Interchange

The only distinction which need be drawn between the molecular and mechanical viscosities is that the latter depends upon the motion, and so may vary from point to point in the stream, whereas the former is a property of the fluid, influenced perhaps by temperature changes, but otherwise constant throughout the stream. Interchanges of mass, whether due to molecular activity or turbulence, will convey heat if the two layers are at different temperatures. So far as molecular interchange is concerned, the heat flow should be proportional to the mass interchanged, to the specific heats of the fluid, and to the temperature difference. The thermal conductivity c of the fluid, defined by:—

$$h = c \frac{d\theta}{dy}$$

should thus be equal to μs, and is approximately so for gases, the observed ratio $\frac{\mu s}{c}$ being sufficiently close to unity to justify the reasoning. For most liquids, however, $\frac{\mu s}{c}$ deviates considerably from unity, and it is necessary to assume that only a fraction of their viscosity is due to molecular interchange: for example, in the case of water at 20° C. the ratio $\frac{\mu s}{c}$ is about 6.3, that is, the observed viscosity is 6.3 times that calculated from its known thermal conductivity.

Axial Flow through Tubes

While any generalisation on the most usual form of construction of heat interchangers would be misleading, one can at least say that that design is widely based on the use of cylindrical tubes. Usually one fluid passes axially through the inside of the tubes, and the other flows over the outside in a direction at right angles to the axis. The two flow problems which arise have very little in common. Hydrodynamically the factors controlling the motion in the two cases are quite distinct, as are the resulting laws connecting the fluid drag with the remaining variables. Within the tube the mean velocity is constant, or nearly so, along the length of the tube. There may be disturbances at the entrance, but further along the coefficient of friction settles down to some value at which it remains constant throughout the remaining length of the tube. The value of the coefficient of friction depends to some extent upon the physical properties and velocity of the fluid, and upon the size of the tube. Since the momentum of the fluid as it leaves the tube is approximately the same as that which it enters, it follows that the difference of pressure at the ends of the tube is almost wholly expended in overcoming the tangential frictional drag exerted by the wall. Generally, the friction is almost independ-

ent of the roughness of the surfaces, provided that irregularities do not exceed those ordinarily found in drawn tubes.

Just as the friction is greater near the entrance so is the heat transfer, and it is only by determining limiting values for heat transfer coefficients that one can arrive at values independent of the ratio of length to diameter of the experimental tubes. Eagle and Ferguson ("Proc. Inst. Mech. E.," 1930, p. 985) mention values which show that after 5 diameters from the beginning of the heated portion of one of their pipes the transfer exceeded the limiting value by about 50 per cent., and that even after 20 diameters the excess was still some 5 per cent. Assuming that the heat transfer is proportional to the friction, then the additional heat transfer near the entrance would be equal to that in an additional length of between ten and twenty diameters. Eagle and Ferguson suggest 15 diameters, but do not quote supporting experiments. McAdams and Frost, from analysis of published experimental data, found the entrance to be equivalent to 4.2 diameters, but possible inaccuracies in the data could explain the discrepancy between this and the previously mentioned figures. The question requires further attention, particularly as it involves uncertainties of the order of 5 to 15 per cent. in much of the published data. Eagle and Ferguson's experiments are, however, free from this uncertainty since the limiting values of the transfer coefficients were determined directly, at a point a hundred or so diameters from the beginning of the heating, and still further from the entrance of the fluid.

Influence of Rate of Heat Flow

In practical heat transfer problems the surfaces are at one temperature and the fluid varies between this and some other temperature. Physical properties of the fluid, such as viscosity, density, conductivity, accordingly vary from point to point within the interchanger, and some discrimination is necessary regarding where these properties are to be measured. If unsuitable mean values be used, then it will be found that the heat transfer coefficient will not be constant, but will vary with the intensity of heat flow. The published experimental evidence on this question is very limited, but the following suggestions may be helpful. It seems reasonable to take both viscosity and conductivity at the mean wall temperature, since both these properties have their greatest influence at the wall. Eagle and Ferguson remark that the fluid friction in their pipes could be correctly estimated if the water were assumed to be at wall temperature. Density, on the other hand, has its greatest influence where accelerations are greatest, and this is usually at some distance from the wall; accordingly, it is reasonable to take the density and specific heat at the mean fluid temperature.

In flow through long pipes the loss of momentum of any stream of air is balanced by the general fall of pressure along the pipe; and each streamline, so far as it maintains its identity, moves with a constant mean velocity. A very different set of conditions obtains when a stream of fluid flows past a fixed obstacle. In this case there is in general no pressure gradient to balance the loss. Accordingly, as each streamline or layer near the obstacle loses momentum by molecular or mechanical exchange, it must lose velocity, and will in turn slow up more distant layers. Since the latter cannot be retarded until the nearer layers have lost an appreciable part of their original energy, it follows that the region from which energy has been abstracted is of restricted dimensions. At the nose of the obstacle only the layer actually in contact with the wall has lost energy. At the downstream end the region of retarded fluid may extend an appreciable distance out into the main stream. The term "boundary layer" is usually applied to this region, which has no relation to the hypothetical viscous film often mentioned in connection with heat transfer. The motion of the fluid within the boundary layer is often turbulent. The outline of the boundary layer crosses streamlines, since the latter become part of the boundary layer just as soon as they begin to lose energy by reason of the retarding influence of the obstacle. The boundary layer idea is seen in its simplest form in the flow past a flat plate placed edgeways in a stream. Here the streamlines are nearly straight and the pressure is practically constant throughout the fluid.

For flow past thin plates there is only one source of drag, due to the tangential action of viscosity. If, however, the plate has appreciable thickness, then the fluid exerts a force on the upstream edge of the plate, and this force acts in the direction of flow. At the downstream end theire is a corresponding force acting in the opposite direction. Unless the speed is very slow, the force at the nose is appreciably greater than that at the downstream end. The plate thus experiences a drag equal to the difference between the two forces, each of which is proportional to the thickness of the plate. With a frictionless fluid the two forces would be equal and the drag zero. In practical fluids the total drag is the sum of the tangential drag, due to viscosity, plus the drag caused by the resulting pressure differences. The latter is usually described as the "form drag."

By choosing a suitable shape it is possible to reduce the "form drag" of an obstacle to a relatively small amount. In fact, one might define a perfectly stream-lined body as one which had a tangential drag only and no form drag. In heat transfer problems, however, cylindrical tubes must generally be used, and unfortunately such tubes lead to much unnecessary distortion of flow. As a result a flow pattern which is built up under one particular set of conditions is usually unstable and liable to change to some other form if the conditions be only slightly modified. Accordingly there is often uncertainty regarding the exact values of the heat transfer and the friction coefficients, both of which are liable to vary considerably under apparently similar conditions. The tangential drag is approximately proportional to the square root of the projected length of the obstacle measured in the direction of flow, whereas the "form drag" is proportional to the maximum dimensions perpendicular to the flow. Except at slow speeds the total drag of non-stream-lined bodies is almost entirely due to the form drag, the tangential drag being negligibly small.

If a frictionless fluid were to flow past a cylinder the upstream and down-stream pressures would be equal, but a region of low pressure and high velocity would be found at the widest part of the cylinder. But in a viscous fluid, and under conditions such that the energy losses have been confined to a relatively small fraction of the fluid, the fluid at the point of low pressure will not have sufficient energy to reach a region of high pressure at the rear of the cylinder, unless fresh energy is supplied from the outer regions. Such fresh energy can only be supplied by the action of viscosity, or mechanical viscosity, and except at very low Reynolds' numbers, a region of stagnation is to be expected at the rear of the cylinder.

Research in the Rubber Industry

Growers, Manufacturers and Users Collaborate

THE preparation of rubber on estates in relation to the requirements of rubber manufacture was the subject of a paper read before the Midland Section of the Institution of the Rubber Industry, at its meeting at Birmingham last week. The author of this paper, Lieut.-Col. B. J. Eaton, director of the Rubber Research Institute, Malaya, commented on the change in the rubber industry during the last three decades, which had seen not only the advent of plantation rubber as a necessary supplement to the supplies of wild rubber, but also the greatest advances in knowledge of the valuable qualities of a unique raw material. Secrecy with respect to the details of rubber manufacure was now a thing of the past and the new spirit of collaboration in the industry had contributed to facilitate the work of such an organisation as that under the speaker's direction.

Important problems of the rubber producer were brought under review by Colonel Eaton, particularly with regard to their bearing on the practical requirements of the rubber consumer and manufacturer—for example, degree of uniformity; various existent and possibly advantageous new grades; the increasing use of rubber latex as a material for the direct manufacture of rubber articles, and its possibility for roadways. The author concluded with mention of the possibility of plantation production of yet further improved types of rubber, and emphasised the value accruing from combination of effort between research organisations representing the interests of the grower, and of the consumer.

The New Patents and Designs Act

By BERTRAM T. KING, Reg. Patent Agent

THE Patents and Designs Act, 1932, which comes into force on November 1, 1932, effects certain changes in the law relating to inventions and industrial designs. Although the alterations are numerous, in this article it is proposed to consider only those which are of general interest to business men and manufacturers whose work brings them into contact with novel developments in commerce and industry.

Provisional Protection

The period of provisional protection under the new Act is extended by three months, so that the complete specification may now be left at any time within twelve months from the date of the application. This period is the same as that allowed in which to file applications abroad under international and inter-colonial arrangements, so that if the complete specification is not left until the end of the period allowed, and if foreign patents are contemplated, then the foreign applications will have to be despatched before the complete specification is on the file in this country. Further, unless the complete specification following the provisional application is left well before the expiration of the twelve months, the search on novelty made by the Patent Office, the result of which very often influences the applicant's decision with regard to foreign patents, will not be available.

An applicant may now request the Comptroller to treat a complete specification filed with the application as though it were a provisional one, or may ask that an application for a patent be post-dated, any time before acceptance, for a period not exceeding six months. The latter is a risky procedure, but may sometimes be desirable.

Search on Novelty

A very important change concerns the search made by Patent Office officials to determine to some degree whether an invention sought to be patented is novel. Formerly the official search was directed to the investigation of previous British patent specifications filed on applications for patents during the past fifty years. Under the new Act the search may be extended to foreign specifications and other documents. The widening of the search brings the English practice more into line with that prevailing in Germany and the United States, but the fact that a patent is granted is still no guarantee of its validity.

Acceptance of Complete Specification

It is anticipated that greater work will be involved in carrying out the more extensive search directed by the new Act, and the time for obtaining acceptance of the Complete Specificaion has been extended to 18 months from the application date. The Government fees on filing a complete specification have also been increased. The time in which a patent must be sealed has been extended from 18 months to 21 months, so that under the new Act, the maximum time within which the patent must be sealed, including extensions of time, which are obtainable (as under the principal Act) is 28 months. Further, this period may be extended by such an amount as appears to the Comptroller to be necessary, if it is proved that hardship would arise in connection with a patent application outside the United Kingdom. This applies particularly in the case of an application for a patent in the United States filed after twelve months from the application date in this country, as the American Patent must issue, *i.e.*, be granted, before any patent for the same invention in any country.

Revocation and Infringement

Many new grounds upon which application may be made by petition to the Court for revocation of a patent have been added. Formerly if in an action for infringement of a patent it was found that some claims of the specifications were valid and that others were invalid the Court was directed to grant relief in respect of the valid claims without regard to the invalid ones. By the new Act the patentee has to furnish proof that invalid claims were framed in good faith and with reasonable skill and knowledge if he wishes the Court to grant relief in respect of valid claims without regard to invalid ones. If the patentee does not furnish such proof the Court will not grant any relief by way of damages or costs but may grant other relief such as an injunction in respect of any valid claim which is infringed. The above provisions make it more than ever necessary to exercise care and to obtain professional assistance in preparing a complete specification.

Frivolous Applications

During the past, patents have been granted for so-called perpetual motion machines and such like contrivances which obviously would not work. The new Act deals with this matter and empowers the Comptroller to refuse to grant a patent upon what he regards as a frivolous application. This is a wise alteration because unfortunately ill-informed inventors and purchasers have sometimes wasted money on patents of this kind.

Unless the Comptroller considers it undesirable, an applicant for a patent for a chemical invention may furnish samples of the chemical substance. Claims may not be included in the complete specification for the substance itself, unless prepared or produced by the methods or processes of manufacture particularly described and ascertained. Moreover, the Act now definitely sets out that in the case of a substance intended for food or medicine a mere admixture of ingredients is not a method or process of manufacture.

Amongst other changes made, there is a tightening up of the law in cases of groundless threats of legal proceedings, provision for the granting of a patent to the assignee of the applicant, the hearing of appeals from the Comptroller's decision by an appeal tribunal and amendments in the law dealing with British applications which are based on applications filed in other countries. In general, the new Act applies to applications filed before as well as after the passing of the Act.

Soya Bean Products

A Steadily Growing Demand Reported

As a result of the steadily growing demand for soya bean products the seaport of Dairen has become the largest oil milling centre in the world, with 67 mills actively engaged in crushing the soya beans grown in Manchuria. The industry has also made great strides in recent years in the United States where soya bean mills with an annual crushing capacity of 10,000,000 bushels of beans are now in operation.

According to W. H. Eastman, who addressed the annual convention of the American Soya Bean Association at Washington, on September 2, the two chief products of the bean are the oil meal and the oil itself, the latter being in the semi-drying category of varnish oils. Whereas direct hydraulic crushing processes are employed almost exclusively in the United States for separating the oil from the meal, the naphtha extraction process is making greater headway in Europe. The prejudice against the latter process in the United States is very persistent, and is not likely to be broken down for a considerable time. The practice of using the ground soya beans themselves as a foodstuff for live stock is greatly to be deprecated owing to the high oil content (20 per cent.) which leads to excessive softness of the animal and vegetable foodstuffs, *e.g.*, pork and butter. The well-cooked soya bean meal with a maximum content of 6 per cent. of oil is far superior in this respect and great efforts are therefore being made to further its use among live stock producers.

With the possible exception of linseed oil, soya bean oil possesses the most varied field of application of any vegetable oil, entering to an ever increasing extent into the manufacture of cooking oils, margarine, soft and liquid soaps, paints and lacquers, printing inks, rubber substitutes and putty. The edible oil industries come first in importance, with soft and liquid soaps taking second place. Linseed oil is not likely to be displaced from its pre-eminent position in the paint industries. It might also be mentioned that the oil meal is replacing animal glue to a considerable extent in the manufacture of glues and adhesives for veneer and plywood.

The Electrometer Valve pH Meter

By W. E. DORAN

THE measurement of hydrogen-ion concentration by the electrometric method has made such rapid progress in the last few years that present day requirements can be met by apparatus requiring no specialised knowledge, and giving accurate information hitherto limited to the research worker. The value of *pH* determination in the control of industrial processes is now too well-known to require any special description, but the simplicity of measurement now possible is not sufficiently appreciated by many chemists.

The *pH* meter suggested by C. Morton, and manufactured by the Cambridge Instrument Co., Ltd., is a direct reading instrument of the electromeer valve type, designed for use with the glass electrode in particular, but applicable to any type of electrode in general use. This instrument (Fig. 1). has a range of 14 *pH* units, readings being taken directly to 0.02 *pH* or by estimation to 0.01 *pH*. Temperature compensation is provided and standardisation of the *pH* : e.m.f. relationship is obtained against a standard cell fitted in the instrument. The number of controls is reduced to a minimum, and a single battery of 12 volts provides the current necessary to operate the apparatus. The circuit is also chosen so that the calibration is unaffected by changes in the valve characteristics or by ageing. A single pointer galvanometer of high sensitivity is incorporated, and as all adjustments are referred to zero deflection, the accuracy of the instrument is unaffected by changes in the galvanometer characteristics.

The Glass Electrode

The glass electrode, the use of which has been restricted until recently to special work where other electrode systems have proved unsatisfactory, provides the simplest and most rapid method of determining the *pH* of any solution. It is free from poisoning, is unaffected by strong reducing agents, and requires a minimum of preparation. It is now possible to construct an electrode of which the resistance is of the order of only a few megohms, thus rendering unnecessary the provision of elaborate shielding which was essential with the earlier form of glass electrode.

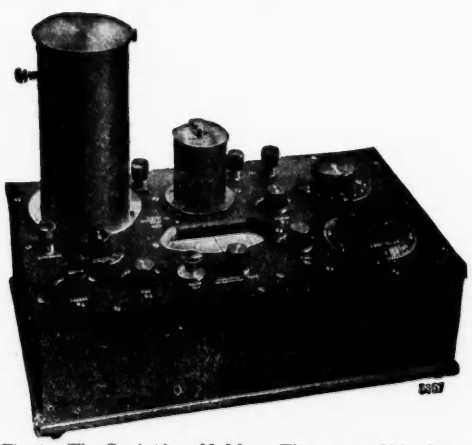


Fig. 1.—The Cambridge pH. Meter (Electrometer Valve Pattern)

The glass electrode developed by Morton (Fig. 2) is probably the most convenient form for general requirements. It is so arranged that the test solution may be rapidly emptied and replaced by the solution to be tested, by the simple manipulation of a single stopcock. In the form supplied by the Cambridge Instrument Co., Ltd., the calomel portion is sent out ready for use, the construction being such that it can be safely sent through the post without being disturbed in any way. An electrode system of this type, used with the *pH* meter described above, provides an outfit of outstanding simplicity and of definite value to chemists for all work requiring knowledge of the *pH* of the processes with which they are concerned. The actual measurements may be left to an assistant or any worker of average intelligence, so that the chemists' time may be devoted to research work.

Referring to Fig. 2 it will be seen that this electrode consists of a bulb of high conductivity glass blown at the lower end of a glass tube filled with N.HCl solution saturated with quinhydrone, contact with which is made by a platinum wire connected to a gold-plated terminal T_1. The liquid whose *pH* is to be determined is introduced by means of the cup H into the vessel A. Liquid connection with the saturated calomel electrode C is established by means of the stopcock S_1, which is used also for draining the vessel and for flushing out the connecting tube. The stopcocks

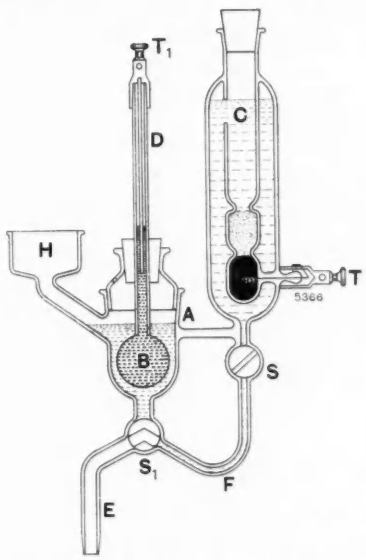


Fig. 2.—The "Morton" Glass Electrode

are closed during measurements. The relationship between e.m.f. and *pH* for the glass electrode is linear within 0.1 millivolt up to *pH* 10. For more alkaline solutions it is necessary to obtain experimental calibration by means of buffer solutions. The system is so designed that the glass electrode may be readily interchanged with either quinhydrone, hydrogen or antimony electrodes, and when combined with the *pH* meter form a universal hydrogen-ion equipment.

Those who have used this apparatus for testing solutions of diverse types have been impressed by the facility of measurement and the consistency of the results obtained, which are entirely free from correction and require no reference to tables or graphs. The apparatus now available provides a direct method of measurement, and may become standard equipment in every modern laboratory.

Synthetic Nitrates

More European Plants Under Construction

EUROPEAN countries continue plans to increase their production of nitrogen, notwithstanding a general world over-production of this commodity. Expansion is in progress in Latvia, Hungary, Bulgaria and Greece. The Latvian Minister of Finance announces coupling a nitrogen plant with the Dahlen waterworks now under construction. A Hungarian nitrogen plant, which has just started operation, plans to produce sufficient to supply the domestic market and ship nitrogenous fertilisers also to Roumania, Yugoslavia, and Greece. Egypt, Bulgaria and Greece have considered plans to build nitrogen plants, although Greece is reported to have closed a deal for its nitrate requirements with the Chilean industry.

British Overseas Chemical Trade in September

A Considerable Decrease in Exports

Exports of chemicals, drugs, dyes and colours, during September amounted to a total of £1,104,104, being £104,636 lower than the figures for September, 1931. Imports totalling £779,320 were lower by £262,389, and re-exports totalling £34,629 were lower by £12,942, as compared with September, 1931.

	Quantities. Month ended September 30, 1931.	Quantities. Month ended September 30, 1932.	Value. Month ended September 30, 1931. £	Value. Month ended September 30, 1932. £
Imports				
Acetic Anhydride cwt.	197	512	580	1,474
Acid, Acetic .. tons	482	490	16,241	16,244
Acid, Tartaric, including Tartrates .. cwt.	3,540	1,922	16,077	7,760
Bleaching Materials ,,	5,491	5,397	10,949	6,393
Borax .. .. ,,	11,614	8,698	7,069	4,370
Calcium Carbide .. ,,	57,112	52,105	35,060	32,471
Coal Tar Products, not elsewhere specified value	—	—	2,914	2,928
Glycerine, Crude .. cwt.	—	8,278	—	9,621
Glycerine, Distilled ,,	2,226	538	4,123	1,038
Red Lead and Orange Lead cwt.	3,071	984	3,800	940
Nickel Oxide .. ,,	—	—	—	—
Potassium Nitrate (Saltpetre) .. .. cwt.	4,392	6,093	4,417	4,114
Other Potassium Compounds .. .. cwt.	305,241	514,132	81,850	136,563
Sodium Nitrate .. ,,	2,120	29,817	903	7,586
Other Sodium Compounds	46,313	10,314	31,151	5,486
Tartar, Cream of .. ,,	2,067	510	7,234	1,736
Zinc Oxide .. tons	576	52	11,479	839
Other Chemical Manufactures .. .. value	—	—	283,744	213,995
Quinine and Quinine Salts oz.	153,957	22,060	10,989	2,204
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	2,567	414	12,090	3,236
Other Drugs .. value	—	—	214,472	83,363
Intermediate Coal Tar Products .. cwt.	64	20	674	323
Alizarine and Alizarine Red .. .. cwt.	—	—	—	—
Indigo, Synthetic ,,	—	—	—	—
Other Dyestuffs .. ,,	2,833	2,349	63,427	56,631
Cutch .. .. ,,	2,003	2,015	2,956	2,122
Other Extracts for Dyeing cwt.	2,388	967	8,857	3,448
Indigo, Natural .. ,,	—	—	—	—
Extracts for Tanning (Solid or Liquid) cwt.	76,600	120,474	62,132	77,301
Barytes, Ground .. ,,	30,265	26,756	6,091	5,330
White Lead, Dry ,,	13,884	7,023	18,225	8,632
Other painters' colours and materials .. cwt.	101,037	65,970	124,205	83,166
TOTAL .. value	—	—	1,041,709	779,320
Exports				
Acid, Sulphuric .. cwt.	3,666	5,708	2,198	2,586
Acid, Tartaric, including Tartrates .. cwt.	752	547	3,501	2,686
Ammonium Chloride (Muriate) .. .. tons	313	220	5,018	4,009
Ammonium Sulphate tons	24,189	26,804	130,521	118,202
Bleaching Powder (Chloride of Lime) .. cwt.	46,890	47,355	13,376	15,270
COAL TAR PRODUCTS—				
Anthracene .. cwt.	—	—	—	—
Benzol and Toluol gal.	6,330	3,597	479	492
Carbolic Acid (crude)	5,563 gal.	2,809 gal.	390	364
Carbolic Acid (crystals) cwt.	681	928	1,735	2,313
Cresylic Acid .. gal.	68,999	57,208	7,002	6,430
Naphtha .. ,,	3,365	4,304	318	378
Naphthalene (excluding Naphthalene Oil) cwt.	8,003	3,924	2,022	1,060
Tar Oil, Creosote Oil, etc. .. .. gal.	3,085,019	1,831,340	57,833	24,508
Other Sorts .. cwt.	4,332	46,741	3,554	9,709
COAL TAR PRODUCTS value	—	—	73,333	45,254
Copper, Sulphate of tons	377	258	6,974	4,128
Disinfectants, Insecticides, etc. .. .. cwt.	25,225	21,173	66,746	48,257
Glycerine, Crude .. cwt.	308	2,489	334	2,535
Glycerine, Distilled ,,	7,077	5,150	10,733	10,037
Potassium Chromate and Bichromate .. cwt.	1,325	1,377	2,773	3,500
Potassium Nitrate (Saltpetre) .. .. ,,	1,414	1,667	2,443	2,433
Other Potassium Compounds .. .. cwt.	6,607	2,905	8,200	5,847
Sodium Carbonate, including Crystals, Ash and Bicarbonate .. cwt.	213,529	212,851	61,028	54,746
Caustic Soda .. ,,	105,679	144,775	76,120	81,052
Sodium Chromate and Bichromate .. cwt.	2,307	819	3,748	1,559
Sodium Sulphate, including Salt Cake .. cwt.	56,194	25,245	6,899	3,002
Other Sodium Compounds cwt.	130,822	74,825	89,412	61,121
Zinc Oxide .. tons	273	586	5,710	10,535
Other Chemical Manufactures .. .. value	—	—	179,210	191,585
Quinine and Quinine Salts oz.	81,426	171,068	8,003	21,495
Other Drugs .. value	—	—	199,831	177,453
Dyes and Dyestuffs (Coal Tar) .. .. cwt.	7,430	7,838	66,570	68,548
Other Dyestuffs .. ,,	8,807	14,105	7,030	11,046
TOTAL .. ,,	16,243	21,943	73,600	79,594
Barytes, Ground .. cwt.	1,736	1,022	644	480
White Lead (Dry)	1,868	1,369	3,023	2,488
Paints and Colours in paste form .. .. cwt.	18,933	16,011	34,744	27,733
Paints and Enamels prepared .. .. cwt.	28,089	23,228	81,394	67,445
Other painters' colours and materials .. cwt.	28,471	32,812	53,218	57,882
TOTAL .. value	—	—	1,208,740	1,104,104
Re-Exports				
Acid, Tartaric, including Tartrates .. cwt.	73	41	426	247
Borax .. .. ,,	480	52	250	34
Coal Tar Products, not elsewhere specified value	—	—	2	13
Potassium Nitrate (Saltpetre) .. .. cwt.	108	158	132	244
Sodium Nitrate .. ,,	1,245	4,000	594	2,000
Tartar, Cream of .. ,,	248	103	1,125	482
Other Chemical Manufactures .. .. value	—	—	13,816	10,728
Quinine and Quinine Salts oz.	6,932	9,090	651	1,158
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	197	42	1,901	146
Other Drugs .. value	—	—	23,343	15,435
Cutch .. .. ,,	863	66	1,579	90
Other Extracts for Dyeing cwt.	17	111	122	443
Indigo, Natural .. ,,	3	2	62	58
Extracts for Tanning (Solid or Liquid) cwt.	1,510	2,931	1,200	2,552
Painters' colours and materials .. .. cwt.	770	237	1,445	797
TOTAL .. value	—	—	47,571	34,629

Works Equipment News

Modern Aids for the Chemical and Allied Trades

IN the chemical industry there are many applications of pumps for various duties. Apart from those where water is the medium to be pumped in common with other industries, there are those where chemicals themselves have to be handled. The pumping of chemicals is a problem which has to be considered carefully, not only from the hydraulic, but also from the metallurgical point of view. In order to

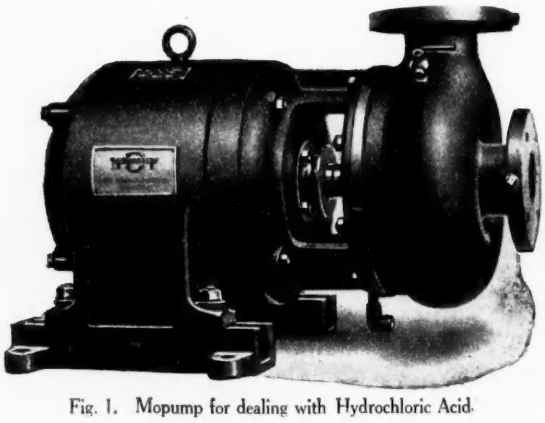


Fig. 1. Mopump for dealing with Hydrochloric Acid

meet the requirements of many applications vulcanite lined pumps have been found eminently suitable. The simplicity of the patent "Mopump" lends itself admirably to the process of vulcanite lining, and Fig. 1 shows one such pump

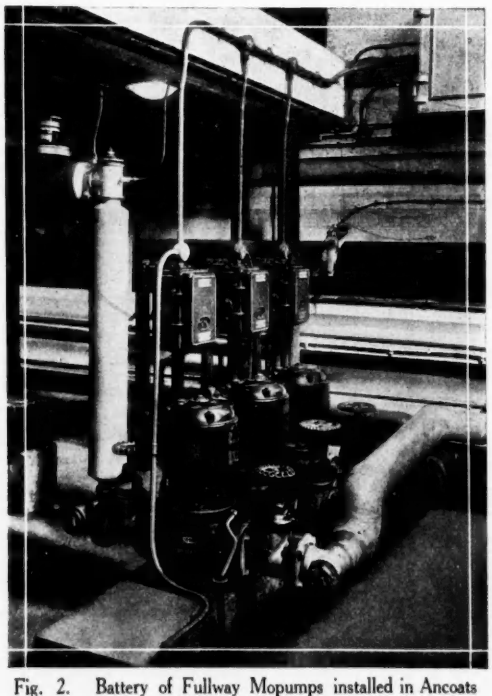


Fig. 2. Battery of Fullway Mopumps installed in Ancoats Hospital, Manchester

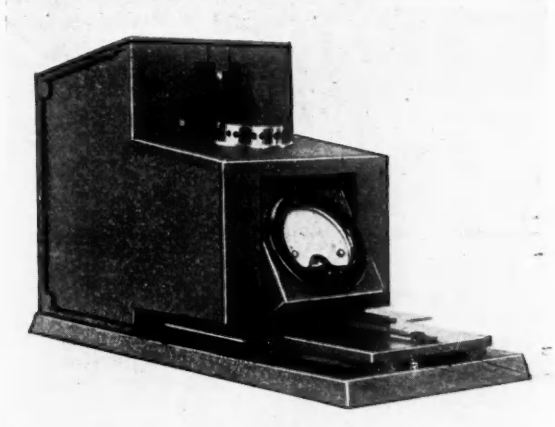
for dealing with hydrochloric acid. One point of interest in these pumps is the selection of suitable linings for the shaft where this passes through the stuffing box and also of suitable packing material.

Apart from these chemical pumps there has, of late years, arisen the question of adequately heating works, laboratories and showrooms. It is now recognised that to obtain satisfactory heating results with the most commonly used hot water systems it is necessary to accelerate the flow by means of pumps. These acceleration pumps enable not only a more rapid heating but better regulation to be obtained. The specially designed "Fullway Mopump" has been developed for this purpose. These pumps have a full way through them so that flow can take place under the action of gravity without opposition when such flow will meet the heating requirements. By installing these pumps which are usually driven by electric motors it is only necessary to shut down the motors when accelerated flow is not required. No valves, either automatic or manual, have to be operated. Large numbers of these pumps have been installed and used as in the typical arrangement at a Manchester hospital, shown in Fig. 2.

An Improved Colorgraph

DURING recent years in connection with the technique of dyeing and finishing textile fabrics, and the increased range and better qualities of dyestuffs, there has evolved a need for the more accurate classification and matching of colours. As regards fabrics, it is obviously impossible to match colours with anything like dependable precision merely by visual inspection. It is well known that the capacity for colour perception varies greatly in different people. In addition, people who can be regarded as having good colour vision vary in their capacity for discerning slight difference between two similar though slightly varying colours. Furthermore, there is the consideration of unreliability of colour perception in the same person at different times, due to fatigue of the eyes, or through having been engaged in the inspection of one particular colour or a range of closely-related colours.

Even in those cases where the human eye is able to discern minute variations in colour, it cannot grade them or accurately measure their components. The Casartelli Colorgraph, made by J. Casartelli and Son, Ltd., can accurately register the amount of variation of colour from



The Casartelli Colorgraph

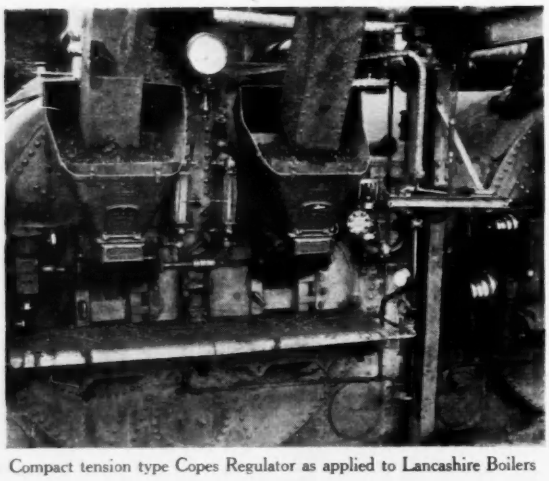
any standard sample. It can repeat the process as often as desired, with the same results every time. It is an instrument for the scientific measurement of colour and removes the risk of errors in colour matching, which are liable to occur when visual inspection is relied upon. The instrument is specially designed for use in connection with the textile, papermaking and paint manufacturing trades, and is of patented design.

A standard sample of fabric, paper or pigment, is placed between the slide and the cover plate of the apparatus, in such a position that the part to be examined comes directly underneath a hole 1¼ in. diameter in the cover plate. The

slide, which works on a stand, is then pushed inside the enclosed compartment of the Colorgraph, taking with it the sample of fabric, paper or pigment. In this manner the part of fabric, paper or pigment comes underneath a lamp. The complete entrance of the slide into the enclosed compartment automatically operates two mercury switches, which light the lamp and the power cell. The exact colour grade of the standard sample is registered on the meter. Similar pieces of fabric, paper or pigment can be treated against the standard sample and the colour grade noted. The slightest variation in shade or lustre causes a different registration on the meter. The cell which operates the readings on the meter is known as the Casartelli "Velcite B," and is of special construction. It is highly sensitive, and is claimed to be devoid of sensitivity loss such as is found in selenium, etc.

Boiler Feed Water Regulators

IT is well known the advantages of automatic feed water regulation for all types of steam boiler include, when carried out on right lines, uniform steam pressure, more efficient running of economisers, superheaters and feed pumps, steam space of proper proportions always present in the boiler, and freedom for the attendants to concentrate upon the firing. One point, however, of great importance, especially when using "Lancashire" boilers, as in the chemical and other industries, is that the attempts made to keep an absolutely uniform water level in the gauge glasses are now obsolete

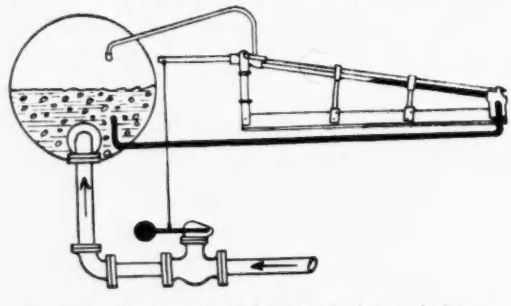


Compact tension type Copes Regulator as applied to Lancashire Boilers

practice. The ideal method when a heavy pull of steam comes on is to allow the water level in the boilers to fall for a considerable period, say 2-3 inches, without immediately increasing the rate of feed, and thereby forcing the boiler to take an extra volume of relatively cold water just at the wrong time. By this means a great increase in the steam output is obtained and full advantage is taken of one of the greatest practical advantages of the "Lancashire" boilers, the very large water content and reserve steam capacity, practically equivalent to an accumulator. Then as soon as the abnormal steam demand goes off the water level can be increased slightly above the normal, since the boiler is now able to give the usual steam output without fall of pressure, and at the same time deal with extra water.

To give some indication of the large storage capacity of the "Lancashire" boiler it may be mentioned that in a standard 30 ft. by 8 ft. size a depth of 2 in. of water in the gauge glasses at the centre line is equivalent to about 2,300 lb. of water, which represents the normal steam output for about 20 minutes. It is this scientific principle of continuous boiler feed with variable water level in the boilers between automatically controlled limits to utilise the accumulator capacity of the boiler that has always been adopted in the "Copes" feed water regulator. An improved type of short regulator for "Lancashire" boilers has now been developed by Copes Regulators, Ltd., of London, which gives just as good results as the firm's well-known "R" type regulator, the latter being for pressures over 300 lb. per sq. in. as operating in power station practice for steam conditions up to 1,400 lb. per sq. in.

The principle used is thermostatic, the regulator being essentially an inclined straight metal tube, supported in a framework with a knuckle joint, the lower part being connected by a narrow bore pipe in the water portion of the boiler and the upper part to the steam space. Consequently the inclined tube or thermostat is always partly filled with



Diagrammatic illustration of the principle of Copes feed water regulator

water and partly with steam, the level being the same as that in the boiler. The water is, of course, not so high in temperature as the steam and the thermostatic tube expands or contracts as the level of the water falls or rises. Also this thermostatic tube has attached at the end a lever device, connected by a vertical rod to an accurately balanced control valve, with lever and weight, on the boiler feed pipe. When the steam demand increases and the water level in the boiler begins to fall the regulator gradually increases the rate of feed until the level has fallen several inches, according to the degree of inclination of the thermostatic tube. Then it increases the feed, and similarly when the steam demand slackens the rate of feed is reduced gradually until the maximum water level is built up in reserve for the next increase demand, giving all the advantages of automatic regulation combined with full utilisation of the reserve capacity of the boilers.

Aluminium Casks

BROOK'S Services, Ltd., are supplying in this country aluminium casks of all capacities, from 4½ gal. to 52 gal. These casks, which have been in use for many years on the

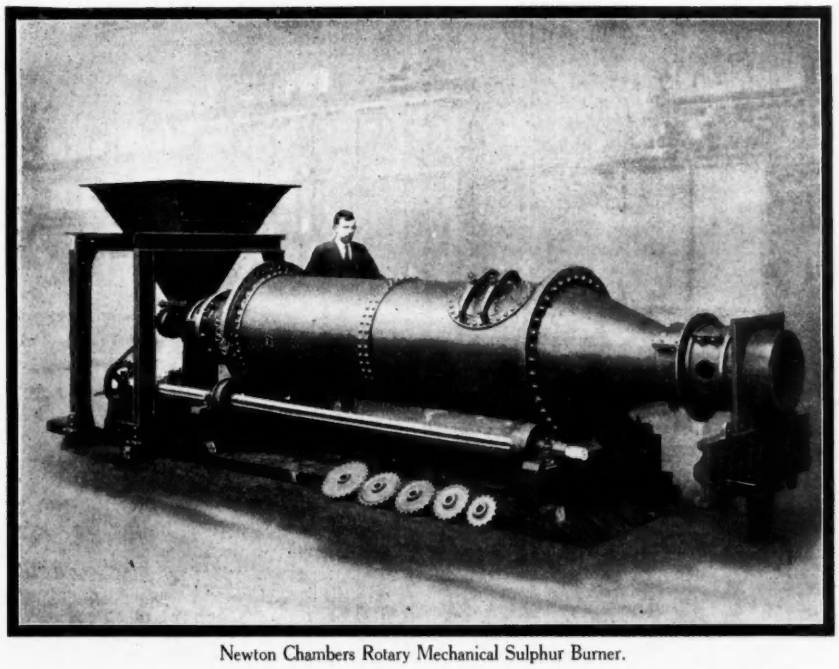
The latest type of Aluminiun Cask

Continent, are comparatively new to this country, having been introduced but nine months ago. Several thousands have been sold in this short time. By means of a patent process, the manufacturers produce casks the ends of which are of considerable thicker gauge and harder material than

the sides, although the two halves are made of one piece each. These are then firmly welded together, making one complete aluminium shell. This shell is encased in two broad steel bands in such a way that the aluminium practically becomes part of this outer steel case. The result is a strong steel container lined with aluminium in such a way that the contents of the cask only come into contact with aluminium, and the cask itself is at the same time strong enough to withstand the severest handling during transport. Several different types of cask have been produced in all standard capacities. The top is provided with a central cover which is removable for racking or cleaning, and this also has a central fitting into which an extractor can be inserted. The type illustrated is fitted with a vent hole and tap, thus enabling the cask to be used for either bottling or draught purposes.

Sulphur Burners

THE Rotary Mechanical Sulphur Burner is used for burning sulphur with air so as to produce sulphur dioxide and sulphur trioxide, these products being further used either for the production of sulphur dioxide in liquid form or for processing in other plant. The most common use of these burners is in conjunction with plants for the production of sulphuric acid either by the "contact" or "chamber" process. For these processes a mixture of sulphur dioxide and sulphur trioxide together with air is essential. This can be produced by burning sulphur in the equipment manufactured by Newton, Chambers and Co., Ltd.



Newton Chambers Rotary Mechanical Sulphur Burner.

The feed hopper is filled with raw sulphur, which should be of a size less than $\frac{3}{8}$ in. The mechanical feed, which consists of a cast iron worm, is operated from the driving shaft through a clutch and chain drive. The clutch is for the purpose of cutting out the feed entirely when necessary and chain wheels of different diameter are provided on the chain drive in order that the rate of feed may be easily adjusted. The worm discharges the sulphur into the burner body which is rotated at a slow speed (about 2 r.p.m.). Once the burner has been put to work and the proper adjustments have been made to the primary and secondary air ports in order to give effective combustion, the heat of the reaction is sufficient to maintain combustion of the sulphur. Accordingly the plant operates continuously. The rotation of the burner carries the molten sulphur up the walls and the showering of this sulphur back into the main bed gives a high capacity to the burner and renders the combustion more complete, thus preventing sublimation. This effect is increased by a system of internal baffles which assist in this rotary action.

A further recent improvement is the installation of a spiral rifling device which ensures that all extraneous matter, such as ash and dust normally present in the original sulphur, is carried through the burner and deposited externally or on the floor of the combustion chamber.

Sifting and Elevating Plant

A QUICK-CHANGE powder dresser specially adaptable to the chemical trades on account of the ease with which it can be applied to various products as required is marketed by William Gardner and Sons (Gloucester), Ltd. The feature of this machine is that the barrel can easily be changed and special barrels can be supplied of various meshes. The parts are detachable and interchangeable for easy cleaning and also for changing quickly from one mesh to another. The dresser will deal with practically any dry powder and will sift these products through the finest mesh. Material that will not pass through the meshes tails out into a special compartment at one end of the machine. An automatic feed is fitted when required, but when the dresser is fed by an elevator or worm, the feed is not always necessary. No brushes are used in this type of machine, but tappers of special design are provided for keeping the sieving meshes clean and open.

For granular substances requiring a gentle sieving action, there is an improved rotary sieve. This machine consists of an enclosed sieve suspended by rods and rotated by a vertical crank shaft, the toe of which is adjustable to any throw and carefully turned to fit a step in the cross bar, and of a special form to allow a free rotary action. These sieves can be divided down the centre, so that two or more distinct products can be sifted at the same time. Revolving reel dressers are used for making coarse or fine separations in china clay, sand, cement, potters' chemicals, etc. and for separations for powders of a gritty cutting nature, such as emery powder.

Reciprocating type sieve separators can be designed to make various separations. A useful machine is the drum type sieve, which will sift different materials at the same time through different grades, and either can be taken out with stopping the machine. A new feeding and elevating apparatus can be regulated to prevent any choking of the elevator. This apparatus is also made to work in conjunction with the firm's patented machines, and is supplied in single, double, treble and quadruple construction. The feeders can be varied at will.

Letters to the Editor

Measurement of pH Values

SIR,—In THE CHEMICAL AGE of August 13 we note that, on page 154, in describing the measurement of *pH* values of rubber latex by the antimony electrode, reference is made to the practical disadvantage of using the glass electrode. We should like the opportunity of pointing out that it is now possible by means of the electrometer valve to make full use of the glass electrode without the difficulties mentioned.

The electrometer valve instrument, when used in conjunction with glass electrodes, is as simple to use as an ordinary potentiometer and has the additional advantage over other methods that it is unnecessary to have technical knowledge, the *pH* readings being obtained direct from the instrument without any reference to tables or graphs. There is no doubt that the introduction of the valve potentiometer is one of the most important advances that has taken place in simplifying hydrogen ion measurements.

In the same issue of THE CHEMICAL AGE (page 139) we note that you have an article dealing with the estimation of moisture, and we would say that we have recently put on the market an electrical instrument which has definite advantages over the one described, the design being based on an instrument which has been used successfully for some years in determining moisture in sugar residue. We also have one of these instruments available for demonstration.—Yours faithfully,

CAMBRIDGE INSTRUMENT CO., LTD.

45 Grosvenor Place, S.W.1.

The British Industries Fair

SIR,—In view of reports current in the Press regarding the withdrawal of the £25,000 Government Publicity Grant to the British Industries Fair, perhaps a brief statement of the present situation will reassure any who may have been fearing that the shutters were about to be put up on the Empire's biggest "shop window."

On the contrary, next February's display promises to be larger than ever. Already 344,290 sq. ft. of space has been applied for at Olympia and the Court of Honour at the White City (where the furniture section will be housed) an increase of more than 35,000 ft. on last year; and the textiles display at the White City will also be larger than at the last Fair. At Birmingham the available space has actually been booked up without the usual organised approach to intending exhibitors. So strong indeed is the belief of manufacturers in the Fair that they have of their own accord written in such numbers asking for space that the Fair buildings at Castle Bromwich are already full up and literally overflowing into sections now being organised outside the main buildings there.

It is, in short, a matter not of opinion but of plain figures that next year's British Industries Fair will have a bigger display than ever of goods to offer to buyers from the Empire and beyond. Nobody disputes that fact. What certain exhibitors do dispute is whether it be true economy to lop off the grant of £25,000 for making the Fair known abroad, and whether the expedient suggested for replacing at least part of this £25,000 be a wise one.

On the latter point I understand that an official announcement is shortly to be made; but meanwhile it ought to be remembered that the business of telling buyers about the Fair has not ceased by any means. Scores of thousands of them have already been asked to the Fair; they have been told of its scope; and there is no doubt that next February will find them flocking as heretofore to Olympia, the White City and Castle Bromwich.—Yours faithfully,

GEO. M. GILLETT.
(Secretary to the Department of Overseas Trade, 1929-1931.)

House of Commons,
October 11, 1932.

Why Import Foreign Products ?

SIR,—How is it that apparently no one in this country thinks it worth while to make and market metaldehyde? Sold in tablet form under the trade name "Meta," the Swiss product appears to command a ready sale as a convenient substitute for methylated spirit, and fetches a retail price of about 4s. 6d. per pound. There are at least three large manufacturers of aldehyde in England, so that there is no lack of raw material produced under economic conditions, and it seems strange that this business is left to the foreigner.—Yours faithfully,

BUY BRITISH.

The Use of Timber in Industrial Plant

Its General Utility and Limitations

INTERESTING facts concerning the applications and preservation of timber were given at the opening meeting of the Glasgow Section of the Society of Chemical Industry on October 7.

Choosing as his subject "Some Properties and Applications of Timber," A. H. Loveless stated that timber still played an important part in the construction of many commercial works and their equipment. With regard to its use in the construction of plant, where the timber came into contact with the materials being handled the first consideration was its ability to resist chemicals. Unless that resistance was satisfactory the timber was useless. For structural purposes the question of corrosion was generally of much less importance and such corrosive action as was encountered could usually be avoided by the use of suitable paint. Wood possessed a structure which was longitudinal. This was fortunate in that whilst penetration of the liquid was much easier in a longitudinal direction, the material was generally in contact with the face of the timber and not the end.

The main value of timber in plant construction depended upon its resistance to a wide variety of acids, whether hot or cold, and it did not give rise to harmful attacks from metallic salts or such as might occur in the dyeing vat. Acid vapours exerted a rapid attack on timber but the effect only penetrated to a limited depth, and if the timber was sufficiently thick that the unattacked portion could carry the load then it was satisfactory. A point of interest was that when timber had been subjected to attack in that way it was rendered practically fireproof.

The life of a wooden tank depended upon the conditions of use. Dry heat caused a loss of strength whilst a hot humid atmosphere was conducive to rapid decay. Generally speaking, a life of 30 to 50 years could be expected from a well-made tank and some had been known to last 100 years.

In his paper on "Modern Methods of Wood Preservation" G. Gunn said the commercial pressure preserving plants in Great Britain at the present day numbered 55; the railway plants, 12; and the commercial open types, 7, making a total of 74. Of the 55 commercial plants 50 were inactive and most of the others out-of-date. Mr. Gunn contrasted the progress of the industry in America with Britain. In the United States the preserving of wood had grown up till now it was a gigantic industry with new works being opened each year. During 28 years of remarkable progress in America the industry in this country had greatly increased. Again we had no statistics showing the quantity of timber treated and preservatives used while in America their records had been compiled for 23 years. Dealing with the various processes employed in preserving timber he said that seasoning was the first step. It prepared the wood for the introduction of the preservative. There were hundreds of wood preservatives on the market, and most of them were harmless to fungus. Preservatives could be divided into two classes—oils and salts. There was a good demand for a really safe and effective salt preservative for wood, but in view of certain disadvantages of many of the salts it remained to be seen which would eventually take the place of creosote.

News from the Allied Industries

Artificial Silk

AT AN EXTRAORDINARY GENERAL MEETING of the Bulmer Rayon Co. (in voluntary liquidation), held on October 10, a resolution was passed authorising the liquidator to raise the necessary amount to satisfy the dissentient shareholders. Mr. L. Edwin Shaw, the liquidator, said he had been successful in reaching a settlement with each individual dissentient without recourse to arbitration. He had dealt with over 30 dissentients representing an aggregate holding of 28,200 preference shares and 44,800 deferred ordinary shares, and the amount required to settle was £1,660 5s. 5d. Shareholders had suggested that the shares to which he had referred should be offered for sale in the first instance to the shareholders of the B.B. Finance Co., Ltd., and the resolution before the meeting would give him authority to take that course. The average price payable to the dissentients was 1s. 2.2d. per preference share, with the deferred shares thrown in, and that would be the basis of the offer to the shareholders, though as a result of consolidation it would work out to between 3s. 6d. and 3s. 9d. per new preference share with four deferred shares given for nothing.

Iron and Steel

THE POLISH IRON SYNDICATE has been prolonged for three years.

QUIET CONDITIONS HAVE DEVELOPED in the iron and steel markets and there has been a tendency to await the announcements which were made this week regarding the Ottawa agreements. Considerable interest also is being taken in the possibility of an alteration in the existing duties when they come up for renewal towards the end of October. Business in pig-iron has been steady. In semi-finished steel business has been limited to comparatively small parcels, most of the business transacted having gone to the British works.

BELGIUM, LUXEMBOURG, FRANCE AND GERMANY have agreed to join in making collective representations to the United States regarding the application to steel imports of the American law of 1923 relating to dumping. The United States authorities are said to be demanding guarantees on consignments of European steel to American ports and to be having inquiries made in Europe by American officials to see that the selling prices of such steel are not lower than cost prices. Meanwhile Belgian steel producers are negotiating among themselves for the organisation of collective agencies for the sale of their products abroad. An agreement is expected shortly.

Non-Ferrous Metals

THE INDIAN COPPER CORPORATION, LTD., proposes to raise additional finance by the issue of new debentures. A circular recalls that the chairman, at the last meeting, referred to the recommendation made by Mr. Carl Lindberg, the mining engineer, as a result of his inspection of the property at the end of 1931, that the productive capacity of the smelter and rolling mill should be increased by 50 per cent. at an estimated cost of £130,000, and stated that, if funds were available, the directors would have no hesitation in giving immediate effect to this recommendation, which would result in a large increase in the profits earned. The scheme now formulated provides not only the sum required for the increase of the plant, but also for further expansion in the future. It provides for (a) the increase of the authorised capital from £750,000, divided into 7,500,000 ordinary shares of 2s. each, to £900,000 divided into 9,000,000 ordinary shares of 2s. each. (b) the increase of the authorised first mortgage debentures from £279,800 to £500,000 by the creation of 2,202 7½ per cent. first mortgage convertible debentures of £100 each; (c) the immediate issue of 1,660 of the new debentures of £100 each. The balance, viz., 602 debentures of £100 each, will be held by the corporation in reserve for issue as and when the directors may decide; (d) the grant to the existing debenture holders (as consideration for their sanction to the creation of the new debentures) and to the holders of the 1,600 new debentures, which it is now proposed to issue, of the right to convert into ordinary shares at any time up to December 31, 1939, at the rate of 800 ordinary shares of 2s. each for every £100 of debentures.

Matches

THE DIRECTORS OF BRYANT AND MAY, LTD., have declared an interim dividend on the ordinary shares of 6 per cent free of tax, the same as last year, when there was a final of 19 per cent., free of tax. An interim of 5 per cent., free of tax, is also announced on the partnership shares. The company, which is controlled by the British Match Corporation, Ltd., holds interests in match factories in Australia, New Zealand, Canada, South Africa and South America, as well as in Great Britain.

Calico Printing

CEPEA FABRICS, LTD., has been registered as a private company, with a nominal capital of £100 in £1 shares. The objects are to acquire the goodwill, trade marks and designs of any business carried on by the Calico Printers' Association, Ltd., and to carry on any business for the time being acquired or carried on by this company as agent for the said association or otherwise, and that of calico printers and bleachers, dyers, etc. The directors are all directors of the Calico Printers' Association, Ltd.

China Clay

EXPORTS of china clay from the United Kingdom during September amounted to 25,055 tons, valued at £39,086, as compared with 37,946 tons valued at £62,308 during September, 1931.

THE DRAFT AGREEMENT between English China Clays, Ltd., Lovering China Clays, Ltd., and H. D. Pochin and Co., Ltd., whereby a new company (English Clays, Lovering, Pochin and Co., Ltd) is to be formed to take over all the interests of the vendor companies so far as they relate to china clays, was approved on October 12 at extraordinary meetings of English China Clays and Lovering China Clays, in the former case unanimously. The proposal that the Lovering debentures should be secured by a specific charge on the preference and ordinary shares to be received from the new company instead of by a floating charge on the whole of the company's assets was also approved.

Borax Potash Enterprise

Refinery in Operation

THE directors of Borax Consolidated, Ltd., in a circular to preferred and deferred shareholders, say that the position of the potash enterprise, in which the company has a substantial interest, is very satisfactory. The refinery, it is added, is now in operation, and its output for several months ahead has been sold, and substantial results should accrue to the company from its investment. This, with the reductions in expenditure and cost of production of borax already effected, should, with a reasonable recovery in general trade conditions, provide an increase of profit and a renewal of the dividends on the preferrd and deferred ordinary shares.

Dangerous Drugs

Amended Rules Necessitated by New Pharmacopoeia

THE Home Secretary has made provisional rules amending the list of preparations in the Third Schedule to the Dangerous Drugs (Consolidation) Regulations, 1928. The rules have been made to meet the situation created by the publication of the new edition of the British Pharmacopœia, which has necessitated a revision of the description of the preparations exempted from the regulations. The rules also exempt mixtures of certain powders, liniments, ointments and plasters, which have been found incapable of causing addiction and from which in practice a dangerous drug cannot be recovered.

The Home Secretary proposes after the expiration of forty days from September 28 to make regulations for amending the Dangerous Drugs (Consolidation) Regulations, 1928, in the terms of the provisional rules which will remain in force in the meantime.

Society of Public Analysts

Milk and Sugar Problems

AN EXTRAORDINARY meeting of the Society of Public Analysts was held at the Chemical Society's Rooms, Burlington House on October 15, Mr. F. W. F. Arnaud, president, being in the chair. Special resolutions were passed for the alteration of certain of the Articles of Association of the Society. This was followed by an ordinary meeting, at which certificates were read for the first time in favour of L. J. Dent and L. A. Haddock. Certificates were read for the second time in favour of A. Littlewood and J. H. Weber. The following were elected members of the Society:—C. C. Marginson, W. Mather, A. D. Mitchell and M. Niyogi.

Mr. E. Hinks gave an account of the work described in the third report of the Milk Products Sub-Committee on the analysis of condensed milk, in which the sucrose has altered during storage, and papers on "A New Copper Reagent for Sugar Determinations," by E. B. Hughes and "A Colorimetric Method for the Determination of Chloroform," by W. G. Moffitt were read and discussed.

Analysis of Condensed Milk

Mr. HINKS referred to the necessity for ascertaining if any significant alteration in the sucrose has taken place, as total milk solids are determined by subtracting the sucrose from the total solids. The problem was at first thought to be one merely of determining invert sugar, but by the study of "aged" sweetened condensed milk by various processes, a modified Barfoed process, copper reduction processes, and in particular a combination of the polarimetric and chloramine-T-iodide oxidation, it was found that, in the experience of the committee, the usual hydrolysis products of sucrose present, if any, were dextrose, laevulose and laevan, the proportion of dextrose being sometimes as high as nine or ten times that of laevulose. This hydrolysis has to be taken into account in judging of the compliance or otherwise of sweetened condensed milk with the Condensed Milk Regulations. The sub-committee recommends that sweetened condensed milk should be examined qualitatively for reducing sugar other than lactose by a modified Barfoed reagent, and that, if significant alteration in the sucrose is disclosed by that examination, the "original sucrose" should be determined by a combination of polarimetric and chloramine-T titration of the fully inverted serum.

Copper Reagent for Sugar Determinations

In connection with the Milk Products Report No. 3, Mr. E. B. Hughes described some work on a new copper reagent for sugar determination which has been carried out in the laboratories of J. Lyons and Co. This reagent consists of copper acetate (5 gms.) mixed with triethanolamine (5 gms.) and made up with water to 100 c.c. The reagent is used in the same way as the modified Barfoed reagent described in the Report. It has selective reducing properties; its action on dextrose is appreciable; its action on laevulose is very much greater, and it is only negligibly active towards sucrose, lactose and maltose. By modifying the formula (also by purifying the triethanolamine) the reagent can be made to react strongly with laevulose, but not to oxidise dextrose. Some preliminary work on the measurement of combined redox potentials of this reagent and sugar solutions were described.

In his paper on "A Colorimetric Method for the Determination of Chloroform," Dr. W. G. Moffitt said the blue colour reactions given by chloroform with alpha- or beta-naphthol in a strong solution of sodium hydroxide have been made the basis of a rapid colorimetric method of determining chloroform. None of the seven chloro compounds tried (including carbon tetrachloride) was found to have any appreciable influence on the reaction with beta-naphthol, although alpha-naphthol gives a blue colouration with carbon tetrachloride under the conditions of the test.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THE London chemical market has remained fairly steady with a much improved demand for chemicals generally. The market for coal tar products is unchanged from last week and the stock position and prices are the same. Prices on the Manchester chemical market during the past week have kept up very well and although here and there slight easiness is still to be reported there are very few instances of this kind. On the whole, it is possible to record a slight increase in buying interest and a moderate aggregate business has been put through during the past week. As before, however, most of the orders that are being placed on this market are not extending over long delivery periods. Business is steady in the Scottish heavy chemical market, but quantities are small. There are no important changes in prices to report. Owing to pressure on space we are unable to give the full price lists this week. The following price changes are reported, the prices for other chemical products remaining the same as those given in pages 343-344 last week.

General Chemicals

ACID, CITRIC.—LONDON: 10½d. per lb. MANCHESTER: 10¼d.
ACID, FORMIC.—LONDON: 10½d. per lb., less 5%.
ACID, TARTARIC.—LONDON: 10½d. per lb.
CADMIUM SULPHIDE.—3s. 2d. to 3s. 6d. per lb.
CARBON BLACK.—4d. to 5½d. per lb., ex wharf.
CARBON TETRACHLORIDE.—£40 to £45 per ton.
LEAD ACETATE.—MANCHESTER: White, £31 10s. per ton; brown, £30.
LITHOPONE.—30%, £18 to £19 per ton.
PHENOL.—Small lots, 6½d. per lb. in 3-cwt. drums, bulk quantities down to 6d., delivered free U.K.
POTASH, CAUSTIC.—MANCHESTER: £40 per ton.
POTASH PERMANGANATE.—MANCHESTER: B.P. 9d. per lb.
SODIUM CHLORATE.—LONDON: £30 per ton.
SODIUM SULPHITE.—MANCHESTER: Concentrated solid 60/62%, £11 per ton.
SULPHATE OF COPPER.—MANCHESTER: £16 10s. per ton, f.o.b.

Coal Tar Products

ACID, CARBOLIC.—Crude 60/s 3% water, 1s. 11d. per gal.
ANTHRACENE OIL.—Strained, 4¼d. to 4½d. per gal.
NAPHTHALENE.—Crude, hot pressed, £6 per ton.
TOLUOL.—90%, 2s. 1d. to 2s. 4d. per gal.

Pharmaceutical and Fine Chemicals

ACID, PYROGALLIC, CRYST.—6s. 9d. per lb.
IODINE RESUB., B.P.— 14s. 8d. to 18s. 9d. per lb.
IODOFORM, B.P., CRYST., PRECIP., OR POWDER.—17s. 7d. to 21s. 7d. per lb.
MENTHOL.—A.B.A., RECRYST. B.P.—11s. 9d. per lb.
POTASS. IODIDE, B.P.—13s. to 15s. 6d. per lb.
SODIUM IODIDE, B.P.—14s. to 17s. 1d. per lb.
TERPINSOL.—1s. 6d. per lb.
ESSENTIAL OILS.—PEPPERMINT: Japanese, 4s. 6d. per lb.; Wayne County, 12s. per lb.

Wood Distillation Products

ACETATE OF LIME, GREY.—£10 10s. per ton.
CHARCOAL.—£6 to £11 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Price for October shipment is unchanged at £4 12s. 6d. per ton f.o.b. U.K. port in single bags. November shipment 2s. 6d. per ton higher. The home price remains unchanged at £5 5s. per ton delivered in 6-ton lots to consumers' nearest station.
NITRATE OF SODA.—£8 9s. per ton for October delivery, for 6-ton lots
NITRO-CHALK.—£7 5s. per ton delivered in 6-ton lots.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Applications

METHOD OF IMPROVING THE DURABILITY OF NITROCELLULOSE COATING COMPOSITIONS AND FILMS. E. I. Du Pont de Nemours and Co. June 19, 1930. 381,168.

MILLS FOR GRINDING MATERIAL IN A LIQUID CONDITION. A. Sonsthagen, J. R. Packman and Keenok C., Ltd. June 22, 1931. 381,153.

PRODUCTION OF SYNTHETIC RESINS. Chemische Fabriken Dr. Kurt Albert Ges. Sept. 19, 1930. 381,200.

MANUFACTURE OF BUILDING BLOCKS AND OTHER PRE-FORMED MOULDED ARTICLES. V. Lefebure and Imperial Chemical Industries, Ltd. June 23, 1931. 381,155.

APPARATUS FOR INDICATING THE SPECIFIC VOLUME OR GRAVITY OF GASES OR VAPOURS. J. Pintsch Akt.-Ges. June 25, 1930. 381,170.

MANUFACTURE AND PRODUCTION OF WETTING, CLEANSING, AND DISPERSING AGENTS. J. Y. Johnson (*I. G. Farbenindustrie*). June 25, 1931. 381,204.

PRODUCTION OF HIGHER ALCOHOLS. British Industrial Solvents, Ltd. (*Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler*). June 25, 1931. 381,185.

AGE-RESISTING RUBBER COMPOUNDS. Imperial Chemical Industries, Ltd., H. M. Bunbury, J. S. H. Davies, and W. J. S. Naunton. June 27, 1931. 381,161.

PROCESS FOR THE MANUFACTURE OF AZO DYESTUFFS CONTAINING COPPER. A. Carpmael (*I. G. Farbenindustrie*). June 30, 1931. 381,188.

VULCANISING RUBBER AND RUBBER-LIKE SUBSTANCES. Imperial Chemical Industries, Ltd., H. M. Bunbury J. S. H. Davies, and W. J. S. Naunton. June 30, 1931. 381,189.

PROCESS FOR MAKING SHAPED, RAPIDLY AND EASILY SOLUBLE MIXTURES OF SOAPS AND PERSALTS. Dr. A. Welter. July 1, 1931. 381,211.

MANUFACTURE OF A TRIAMINODIPHENYL SULPHONIC ACID AND OF CARBAZOLE COMPOUNDS THEREFROM. A. Carpmael (*I. G. Farbenindustrie*). July 1, 1931. 381,212.

PROCESS FOR THE MANUFACTURE OF 2-2^1-DIAMINO-DIPHENYL-4.4^1-DISULPHONIC ACID. A. Carpmael (*I. G. Farbenindustrie*). July 1, 1931. 381,213.

COMPOSITIONS FOR IMPREGNATING AND COATING TEXTILES, AND THE USE THEREOF. Imperial Chemical Industries, Ltd., W. E. Sanderson and F. J. Siddle. July 3, 1931. 381,225.

PRODUCTION OF ARYL MERCAPTO COMPOUNDS. Imperial Chemical Industries, Ltd., and K. W. Palmer. July 6, 1931. 381,237.

BROWN ACID AZO-DYESTUFFS. Imperial Chemical Industries, Ltd., and M. Mendoza. July 6, 1931. 381,238.

MANUFACTURE OF INDOPHENOLS, OF THE NAPHTHO-CARBAZOLE SERIES AND OF DYESTUFFS DERIVED THEREFROM. A. Carpmael (*I. G. Farbenindustrie*). July 24, 1931. 381,265.

PROCESS FOR MANUFACTURING BITUMEN EMULSION PAINTS. Naamlooze Vennootschap tot Voortzetting der Zaken Van P. Schoen and Zoon. Aug. 19, 1930. 381,286.

MANUFACTURE OF INSECTICIDES. C. de Gendre. Aug. 24, 1931. 381,290.

TREATMENT OF LIQUIDS. G. S. Whitham, R. C. Bowden, and T. A. Smith. Aug. 24, 1931. 381,291.

MANUFACTURE OF PARAFFIN WAX OF HIGH MELTING POINT. A. J. Gentil. Aug. 4, 1931. 381,308.

MANUFACTURE OF PRODUCTS SUITABLE FOR USE AS SUBSTITUTES FOR NEATS FOOT OIL. F. B. Dehn (*Deutsche Hydrierwerke*). Sept. 15, 1931. 381,316.

PRODUCTION OR ORGANIC SALTS OF BISMUTH. Boots Pure Drug Co., Ltd., F. L. Pyman and A. P. T. Easson. Oct. 29, 1931. 381,362.

DESTRUCTIVE HYDROGENATION OF DISTILLABLE CARBONACEOUS MATERIALS. J. Y. Johnson (*I. G. Farbenindustrie*). Nov. 2, 1931. 381,367.

PRODUCTION OF ALKALINE HYDRATES AND AMMONIA FROM ALKALINE BICARBONATE OF CARBONATE. A. Mentzel. Dec. 17, 1930. 381,373.

PREPARATION OF ALKALINE-EARTH ALUMINATES. Lonza-Werke Elektro-Chemische Fabriken Ges. Dec. 6, 1930. 381,300.

PRODUCTION OF SYNTHETIC RESINS OF THE ALKYD TYPE, AND COMPOSITIONS CONTAINING THE SAME. R. L. Yeates, and Grindley and Co., Ltd. Jan. 9, 1932. 381,422.

VACUUM DISTILLATION. C. Arnold (*Standard Oil Development Co.*) Jan. 15, 1932. 381,427.

PROCESS AND APPARATUS FOR THE SIMULTANEOUS RECOVERY AND PURIFICATION OF BENZOL CONTAINED IN BENZOLATED OILS. Soc. des Etablissements Barbet. Jan. 21, 1931. 381,429.

PROCESS OF AND APPARATUS FOR THE SEPARATION OF SOLID SUBSTANCES FROM LIQUIDS BY VACUUM COOLING IN STAGES. Metallges Akt.-Ges. July 15, 1931. 381,439.

MANUFACTURE OF RIBBONS FROM SOLUTIONS OF CELLULOSE OR CELLULOSE DERIVATIVES. I. G. Farbenindustrie. March 4, 1931. 381,456.

PROCESS OF ISOLATING α -PHENYLETHYLENE αβ-DICHLORIDE. I. G. Farbenindustrie. May 13, 1931. 381,459.

PROCESS FOR COATING METAL BODIES WITH ONE OR MORE ALKALINE-EARTH CARBONATES. Vereinigte Glülampen und Electricitäts Akt.-Ges. April 22, 1931. 381,486.

PREPARATION OF ALUMINA. H. Wünsche. Nov. 23, 1931. 381,520.

Complete Specifications open to Public Inspection

PROCESS FOR THE PRODUCTION OF LIQUID SOAPS. Deutsche Hydrierwerke Akt.-Ges. Sept. 29, 1931. 6473/32.

PRODUCTION OF ETHYLENE OXIDE, PARTICULARLY FOR THE PREPARATION OF ETHYLENE-GLYCOL AND OF ITS DERIVATIVES. Soc. Francaise de Catalyse Generalisée. Oct. 3, 1931. 2561/32.

MANUFACTURE OF DYESTUFFS CONTAINING CHROMIUM. Soc. of Chemical Industry in Basle. Sept. 29, 1931. 21229/32.

METHOD OF CHLORINATING SULPHIDE ORES. Intermetal Corporation. Oct. 3, 1931. 21776/32.

APPARATUS FOR PRODUCING ANHYDROUS ETHYL ALCOHOL DIRECTLY FROM MASHES AND THE LIKE. Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. Oct. 2, 1931. 21807/32.

PROCESS FOR THE PRODUCTION OF POTASSIUM CARBONATE. Kali-Chemie Akt.-Ges. Sept. 29, 1931. 22843/32.

PROCESS FOR THE CONTINUOUS PRODUCTION OF PHOSPHORUS, AND OXYGEN COMPOUNDS THEREOF. Panstwowa Fabryka Zwiazkow Azotowych. Sept. 28, 1931. 22963/32.

MANUFACTURE OF ARTIFICIAL RESIN. L. D'Antal. Oct. 3, 1931. 26491/32.

MANUFACTURE OF AZO-DYESTUFFS CONTAINING COPPER. I. G. Farbenindustrie. Sept. 28, 1931. 26830/32.

AZO-DYESTUFFS. W. E. Kemmerich. Sept. 29, 1931. 27092/32.

MANUFACTURE OF POLYMORPHOUS SUBSTANCES IN A DISTINCT CRYSTAL FORM. I. G. Farbenindustrie. Oct. 1, 1931. 27230/32.

PRODUCTION OF 6-CHLORO-*o*-TOLUIDINE. E. I. Du Pont de Nemours and Co. Oct. 3, 1931. 27398/32.

MANUFACTURE OF ORGANIC COMPOUNDS CONTAINING BROMINE. E. I. Du Pont de Nemours and Co. Oct. 3, 1931. 27400/32.

PROCESS FOR THE TREATMENT OF TANNED OR NON-TANNED ANIMAL HIDES. I. G. Farbenindustrie. Oct. 3, 1931. 27426/32.

Applications for Patents

BENZYL CELLULOSE. P. C. M. Ash and S. W. Wilding. Oct 4. 27594.

PRODUCTION OF PRCTECTIVE COATINGS RESISTANT TO LIQUID FUELS. E. Asser. Oct. 6, 27743.

MANUFACTURE OF HYDROCHLORIC ACID. J. P. Baxter and Imperial Chemical Industries, Ltd. Oct. 7. 28013.

ALCOHOLIC FERMENTATION. C. H. Bennett. Oct. 6. 27757.

PREPARATION OF FIBROUS CELLULOSE ESTER. C. F. Boehringer and Soehne Ges. Oct. 4. (Germany, Oct. 5, '31.) 27542.

TREATMENT OF CELLULOSE DERIVATIVES. British Celanese, Ltd. Oct. 6. (United States. Oct. 6, '31.) 27866.

MANUFACTURE OF DYESTUFFS. British Celanese, Ltd., H. C. Olpin, and G. H. Ellis. Oct. 8. 28084.

INDIGO DYEING. D. Carter, Imperial Chemical Industries, Ltd., and J. G. Evans. Oct. 4. 27563.

MANUFACTURE OF UNSATURATED ESTERS. W. Cocker and J. S. H. Davies. Oct. 3. 27399.

REDUCTION OF CARBONATES, ETC. H. E. Coley. Oct. 3. 27406.

EXTRACTION OF GOLD FROM ARSENICAL ORES. H. E. Coley. Oct. 3. 27407.

MANUFACTURE OF ALUMINIUM IN ELECTROLYSIS CELLS OF HIGH POWER. Compagnie de Produits Chimiques et Electro-métallurgiques Alais, Froges, et Camargue. Oct. 3. (France, Oct. 21, '31.) 27408.

BASIC DYESTUFFS. J. S. H. Davies and Imperial Chemical Industries, Ltd. Oct. 6. 27842.

TREATMENT OF HYDROCARBONS. S. Dunlop (*Ionising Corporation of America*). Oct. 7. 27957.

PRODUCTION OF 6-CHLORO-O-TOLUIDINE. E. I. Du Pont de Nemours and Co. Oct. 3. (United States, Oct. 3, '31.) 27398.

MANUFACTURE OF ORGANIC COMPOUNDS CONTAINING BROMINE. E. I. Du Pont de Nemours and Co. Oct. 3. (United States, Oct. 3, '31.) 27400.

MANUFACTURE OF DYESTUFFS. E. I. Du Pont de Nemours and Co. Oct. 6. (United States, Oct. 7, '31.) 27800.

PHYSICO-CHEMICAL OPERATIONS BETWEEN GASES AND LIQUIDS. E. A. Gaillard. Oct. 5. (France, Oct. 6, '31.) 27720.

MANUFACTURE OF GLUCOSIDES OF PHENOLS, ETC. B. Helferich. Oct. 6. (Germany, Oct. 16, '31.) 27817.

DISINFECTANTS, ETC. Henkel et Cie Ges. Oct. 6. (Germany, Oct. 29, '31.) 27819.

From Week to Week

OIL IMPORTS into Swansea for the four weeks ended September 25, the last ascertainable monthly period, amounted to 57,113 tons against 11,964 in the previous month.

SIR ERNEST BENN presided at the 55th Individualist Luncheon at the Hotel Victoria, London, on Wednesday, when the Duchess of Atholl gave an address on Russia.

METHODS ARE BEING SOUGHT by the Chilean Foreign and Finance Ministers for opening the market to Chilean nitrate in Europe. An agreement is sought with Italy, France and Spain for the exchange of nitrate for raw materials.

A LARGE NEW OCHRE DEPOSIT has been discovered on the lands of Mr. Joseph Ryan at Callaghane, County Waterford, and samples of earth from the surrounding district have been submitted for examination by experts in Dublin.

THOSE WHO REMEMBER Miss Betty Benn's Hallowe'en party at the John Benn Hostel, Stepney, last year will be glad to know that a repetition of its delights is announced for October 31. Sydney Howard has promised to be present, thus following the tradition set by Bobby Howes last year.

MR. CHARLES M. SCHWAB, the president of the Bethlehem Steel Corporation, New York, has sailed for England to-day on board the "Europa" to receive the Melchett Medal for distinguished achievement in industry. The presentation will be made at the annual meeting of the Institute of Fuel of Great Britain.

AT THE ANNUAL DINNER of the Institution of Petroleum Technologists, held in London on October 7, Professor J. S. S. Brame said that in 20 years the annual world output of petroleum had increased from 26,500,000 tons to 200,000,000 tons. From crude petroleum no fewer than 260 products, from asphalt to chewing gum, were actually obtained.

MEMBERS OF THE CERAMIC SOCIETY will have the privilege of visiting the Pottery Works of Pearson & Co. (Chesterfield), Ltd., at Whittington Moor, near Chesterfield, on October 19. It is believed that this visit will prove of very considerable interest to members, by reason of the products handled and the methods of firing which have been adopted at this works.

A FIRE OCCURRED last week at the premises of Fletcher, Miller and Co., oil importers, etc., Cardiff. Flames shot 50 feet and more high, and the Cardiff Fire Brigade was assisted by strong bands of police and organised railway and other workers to prevent the outbreak spreading to the oil works of James Arnott and Sons, Ltd., only a few yards away. The premises of the Eagle Paintworks were also endangered. In Arnott's works there were thousands of barrels and drums of oil.

THE OPENING MEETING of the Yorkshire Section of the Society of Chemical Industry will be held on Monday, October 24, at the Great Northern Hotel, Leeds, at 7.15 p.m., when an address on "Industrial Solvents," will be given by F. W. Clark. As a result of the development of synthetic chemistry, many compounds which were formerly curiosities of the research laboratory are now available for industrial purposes, their properties are of interest to all industrial chemists.

MR. H. J. PAGE has been appointed controller of the Agricultural Research Station of Imperial Chemical Industries, Ltd., at Jealott's Hill, Bracknell, Berks, following the release of Sir Frederick Keeble, F.R.S., from his executive and routine duties at that research station. Mr. Page was, until 1927, head of the chemical department and chief chemist at the Rothamsted Experimentl Station, and since that time has held the position of head of the research laboratories and chief chemist at the research station of which he has now taken charge.

THE FIRST MEETING of the Birmingham and Midlands Section of the Society of Chemical Industry will be held jointly with the University Chemical Society on Monday, October 17, at 5.45 p.m., in the Chemistry Lecture Theatre, Edgbaston, when Professor W. N. Haworth, F.R.S., will lecture on "The Structure of Complex Carbohydrates." The next meeting of the society will be held on November 10 when Dr. J. C. Hudson will deal with "Experimental Methods for the Study of Corrosion." On December 8 the Jubilee Memorial Lecture will be given by Dr. E. F. Armstrong, F.R.S.

THE FEDERATION OF BRITISH INDUSTRIES has appointed Mr. Guy Locock as director of the F.B.I. Mr. Locock began his career in the Foreign Office, where he filled the office of private secretary to various Ministers, including the Minister of Blockade. In 1918 he was attached to the Department of Overseas Trade as private secretary to the Minister on the formation of that Department. Since joining the Federation of British Industries as assistant director in 1919, Mr. Locock has applied his activities to every side of industrial development, particularly in respect of our foreign and Imperial trade. He has carried out various missions on behalf of the Federation, in the course of which he has travelled extensively in the North and South American Continents, and in Europe and the Near East.

ABOUT FORTY ADDITIONAL MEN have been started at the Urbay Nook Chemical Works, Yarm, Yorkshire. It is understood that there are prospects of further men being started soon.

AMONG RECENT ELECTIONS TO MEMBERSHIP of the Manchester Chamber of Commerce are the Silver Springs Bleaching and Dyeing Co., Ltd., and the Tower Manufacturing and Chemical Co., Ltd.

MR. H. C. PARMELEE, formerly secretary of the American institute of Chemical Engineers, has been appointed a three-year member of the National Research Council of the United States, on the division of engineering and industrial research.

BARKER, BRETTELL AND DUNCAN, chartered patent agents, have removed from 59 and 60, Chancery Lane, to Furnival House, 14-18 High Holborn, London, W.C.1, and their telephone number is now Chancery 7994.

THE IMPORT DUTIES ADVISORY COMMITTEE gives notice of an application for an increase in the duty on rice starch and compounds thereof. Any representations which interested parties desire to make in regard to these applications should be addressed in writing to the secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, London, S.W.1, not later than October 28.

THE FINSBURY TECHNICAL COLLEGE OLD STUDENTS' ASSOCIATION is proposing to hold a series of informal and inexpensive dinners during the next six months to enable old students to "get together." Those who are interested are asked to write to the hon. secretary, F. R. C. Rouse, at Venner Time Switches, Ltd., New Malden, Surrey, or 15 Clifton Gardens, Golders Green, N.W.11.

UNFORTUNATELY TWO ERRORS OCCURRED in the copy of the advertisement of Dexine, Ltd., in our last issue. The paragraph calling attention to the illustration of a "Dexonite" gland type cock was erroneously printed as "Stand" type cock, which was obviously wrong. Likewise the word "Attached" in the last line should have read "Attacked." The advertisement will be correctly presented in our issue of October 22.

THE AUSTRALIAN CANNING CO., LTD., has been registered as a private company with a nominal capital of £25,000 in £1 shares. The objects are to acquire from the Western Australian Development Syndicate, of London and Perth, Western Australia, the turtle canning factory at Cossack, North Western Australia, and also the West Australian Government concession granting the exclusive turtle fishing rights of the area known as Monte Bello Islands, near Cossack.

IN THE COURSE OF HIS PRESIDENTIAL ADDRESS to members of the Birmingham, Coventry and West Midlands branch of the Institute of British Foundrymen, at the Chamber of Commerce Buildings, Birmingham, Mr. J. G. Pearce, director of the British Cast Iron Research Association, referred to the recent international Foundry Congress, which he attended in Paris, and spoke of conditions in France and Germany, stressing the importance of adequate statistical knowledge for the industry.

THE ANNUAL GENERAL MEETING of the Leeds Area Section of the Institute of Chemistry will be held on Monday, November 14, to elect four members of committee and two auditors. The committee consists of the following members, of whom the first four retire and are ineligible for election for one year: H. M. Mason, J. A. Reddie, Professor F. M. Rowe, J. W. Wood, Professor F. Challenger, J. Firth, G. Hagues, A. Taylor, A. C. Francis, T. Hayes, H. J. Hodsman, A. T. King. Nominations signed by two members must be lodged with the secretary 21 days before the annual general meeting.

TO TREAT THE PITCHBLENDE ORES from the recently opened properties on the shores of Great Bear Lake, discovered by LaBine in 1930, it is proposed to establish a radium refinery in a two-storey building at Port Hope, Ontario. A French chemist, M. Pochon, has been working on radium extraction processes, and the Department of Mines at Ottawa has been making an extensive study of methods for the treatment of pitchblende for the recovery of radium. Some 20 tons of ore were brought out last year, and additional supplies will be available for treatment by the time the plant is ready to operate.

THE DIRECTORS OF LEVER BROTHERS, LTD., have decided to take advantage of the lower interest rates now ruling. The company is calling for redemption on January 2 next its 5 per cent. first mortgage debenture stock, of which there is about £3,268,780 outstanding. A new 4 per cent. Consolidated Debenture stock has been created; it will rank *pari passu* in point of security with the 5 per cent. Consolidated Debenture stock issued last March, in replacement of the 7 per cent. Debenture stock which was called for redemption. The amount of the new stock, which is redeemable 1943-58, will be £2,288,146, equal to 70 per cent. of the amount of stock to be redeemed, the remaining 30 per cent. is not being replaced, and the sum required for its redemption (over £1,000,000) will be provided out of the cash resources of the company.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

BARKER (FRANCIS) AND SON, LTD., London, E.C., scientific instrument makers. (M., 15/10/32.) Registered Oct. 3, £300 and £300 debs., to F. J. Stevens, Guildhall, E.C., and Mrs. L. H. Barker, 5 Berkshire Gardens, Palmers Green; general charge. *Nil. April 27, 1931.

BRITISH TINTEX AND DYE PRODUCTS, LTD., London, W. (M., 15/10/32.) Registered Oct. 4, £1,000 debs., to Continental Tintex and Dye Products, Ltd., 4 Queen Victoria Street, E.C.; general charge. *Nil. July 14, 1932.

CHEMICAL AND METALLURGICAL CORPORATION, LTD., London, E.C. (M., 15/10/32.) Registered Sept. 28, £100,000 secured notes and 10% premium; charged on property at Runcorn, also general charge. *£113,670. July 5, 1932.

ZINC MANUFACTURING CO., LTD., London, E.C. (M., 15/10/32.) Registered Sept. 29, £15,000 deb., to Stewarts and Lloyds, Ltd., Glasgow; 1st charge on company's plant, etc., at Victoria Wharf, Dartford, also general charge. *——. Dec. 7, 1931.

Satisfaction

BRITISH TAROLEUM CO., LTD., London, S.W., tar manufacturers. (M.S., 15/10/32.) Satisfaction registered Oct. 3, of deb. registered May 22, 1928.

London Gazette, &c.

Partnership Dissolved

BLOOD RYAN AND FOXWELL (Geoffrey Edwin Foxwell and Hugh William Blood Ryan), scientific and industrial consultants, 29 Welbeck Street, London, by mutual consent, September 30, 1932.

Forthcoming Events

Oct. 17.—Society of Chemical Industry (Birmingham and Midland Section). Joint meeting with University Chemical Society. "The Structure of Complex Carbohydrates." Professor W. N. Haworth. 5.45 p.m. Chemistry Lecture Theatre, Edgbaston, Birmingham.

Oct. 17.—Institution of the Rubber Industry (Manchester Section). "Gutta Percha—Its Characteristics and Manufacture." A. E. Penfold. The Reynolds Hall, College of Technology, Manchester.

Oct. 18 and 19.—Society of Glass Technology. University, Sheffield.

Oct. 19.—Institute of Fuel. Presidential Address by Sir Hugo Hirst, followed by a short address from Charles M. Schwab, Melchett Medallist. 11.30 a.m. "The Marketing of Pulverised Coal." Commander H. D. Tollemache. 2.30 p.m. Lecture Theatre the Institution of Electrical Engineers, Savoy Place, London.

Oct. 19.—Electroplaters' and Depositors' Technical Society. Presidential Address. 8.15 p.m. Northampton Polytechnic Institute, London.

Oct. 19.—Society of Dyers and Colourists (Midlands Section). "The Application of Dyestuffs for non-Textile Purposes." J. C. Grundy. Derby.

Oct. 20.—Oil and Colour Chemists' Association. "Some Notes on Physical Methods for the Examination of Paints." J. A. Frome Wilkinson. Palace Hotel, Bloomsbury Street, London. Preceded by an Informal Dinner at

Oct. 20.—Institute of Metals (Birmingham Section). Lecture by Sir Charles Grant Robertson. 7 p.m. University Birmingham.

Oct. 20.—The Chemical Society. Ordinary Scientific Meeting. 8 p.m. Burlington House, London.

Oct. 20.—Institute of Chemistry and Society of Chemical Industry (Edinburgh and East of Scotland Sections). Joint Meeting. "Some Recent Work on the Chemistry of Proteins." Dr. W. O. Kermack. 8 p.m.

Oct. 21 and 28.—The Institute of Chemistry. "The Nature of Simple Molecules and of Elementary Processes." Professor A. J. Allmand. 8 p.m. 30, Russell Square, London.

Chemical Trade Inquiries

Abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

India and Far East.—A travelling representative with many years' experience in iron and steel and allied products will shortly be undertaking his annual tour and is prepared to look after the interests of one or two important United Kingdom manufacturers of goods complementary to the lines he already holds. (Ref. No. 497.)

Portugal.—The Commercial Secretary to H.M. Embassy at Lisbon reports that tenders are invited by the Portuguese Railway Company (Compagnie des Chemins de Fer Portugais) for the supply and delivery of 600 metric tons of creosote for the impregnation of railway sleepers. The offers will be received by the Compagnie des Chemins de Fer Portugais (Voie et Travaux), Lisbon, up to October 17, 1932. Quotations should be c.i.f. Lisbon, shipment to be effected by tank steamer and the creosote delivered into the company's vats. (Ref. F. 1608.)

Egypt.—The Commercial Secretary to the Residency, Egypt, has forward the specification relative to a call for tenders by the Ministry of Public Works, Mechanical and Electrical Department, Cairo, for the supply of one low-pressure steam boiler, working pressure not to exceed 10 lb. per sq. in., capable of evaporating 10 gallons per hour, and two electrically driven anti-acid ventilating sets, each composed of a fan capable of exhausting 36 cubic feet per minute of free air, with a suction branch of 30 cms. diameter, directly coupled to an electric motor working on a.c. current, single phase, 200 volts 40 periods. Tenders are due on November 7, 1932. (Ref. G. 11921.)

New Chemical Trade Marks

Compiled from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to October 28, 1932.

Ocenol. 532,599. Class 1. High molecular alcohols of the fatty series. Deutsche Hydrierwerke Aktiengesellschaft, Kantstrasse 163, Berlin-Charlottenburg, Germany. June 13, 1932.

Adcol. 534,211. Class 1. Chemical substances for removing incrustation from oil containers. Alexander Duckham & Co., Ltd., Duckham House, 16 Cannon Street, London, E.C.4. August 4, 1932.

Estriol. 534,445. Class 3. Chemical substances prepared for use in medicine and pharmacy. May & Baker, Ltd., Garden Wharf, Church Road, Battersea, London, S.W.11. August 24, 1932.

Oestrogen. 534,585. Class 3. Chemical substances prepared for use in medicine and pharmacy. The British Drug Houses, Ltd., 16 to 30 Graham Street, City Road, London, N.1. August 30, 1932.

Liqualed. 533,299. Class 1. Pigments, paints and enamels (in the nature of paints). The Cookson Lead and Antimony Co., Ltd., Milburn House, Dean Street, Newcastle-upon-Tyne, Northumberland.

Downorite. 533,381. Class 2. Chemical substances used for agricultural, horticultural and sanitary purposes. Robinson Brothers, Ltd., Phoenix Works, Phoenix Street, Ryders Green, West Bromwich. July 12, 1932.

Stanoid. 534,141. Class 1. Chemical substances used in manufactures, and philosophical research, and in photography. Griffin and Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2. August 10, 1932.

Diazopon. 534,388. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. I. G. Farbenindustrie, A. G., 28 Mainzer-Landstrasse, Frankfort-on-Main, Germany; manufacturers. August 22, 1932.

Sterogen. 534,150. Class 2. Chemical substances used for agricultural, horticultural, veterinary, and sanitary purposes. Herbert & Sons, Ltd., 6 and 7 West Smithfield, London, E.C.1, manufacturers. August 10, 1932.

Duprene. 530,170. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. E. I. Du Pont De Nemours & Co., 1007 Market Street, Wilmington, County of Newcastle, State of Delaware, United States of America. March 12, 1932. (By consent.)

Noveloid. 533,912. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including surface coating preparations for wood and metal and not including any goods of a like kind to any of these excluded goods. Nobel's Explosives Co., Ltd., Nobel House, Stevenson, Ayrshire. July 30, 1932.

ADVERTISERS please note that the latest hour at which we can accept advertisements for insertion in these columns each week is 10 o'clock on Thursday morning.

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